VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

Hitish Rao P (1BM23CS116)

in partial fulfilment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
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B.M.S. College of Engineering,

Bull Temple Road, Bengaluru 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **Hitish Rao P (1BM23CS116),** who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Ambuja Assistant Professor Department of CSE, BMSCE	Dr. Jyothi S Nayak Professor & HOD Department of CSE, BMSCE

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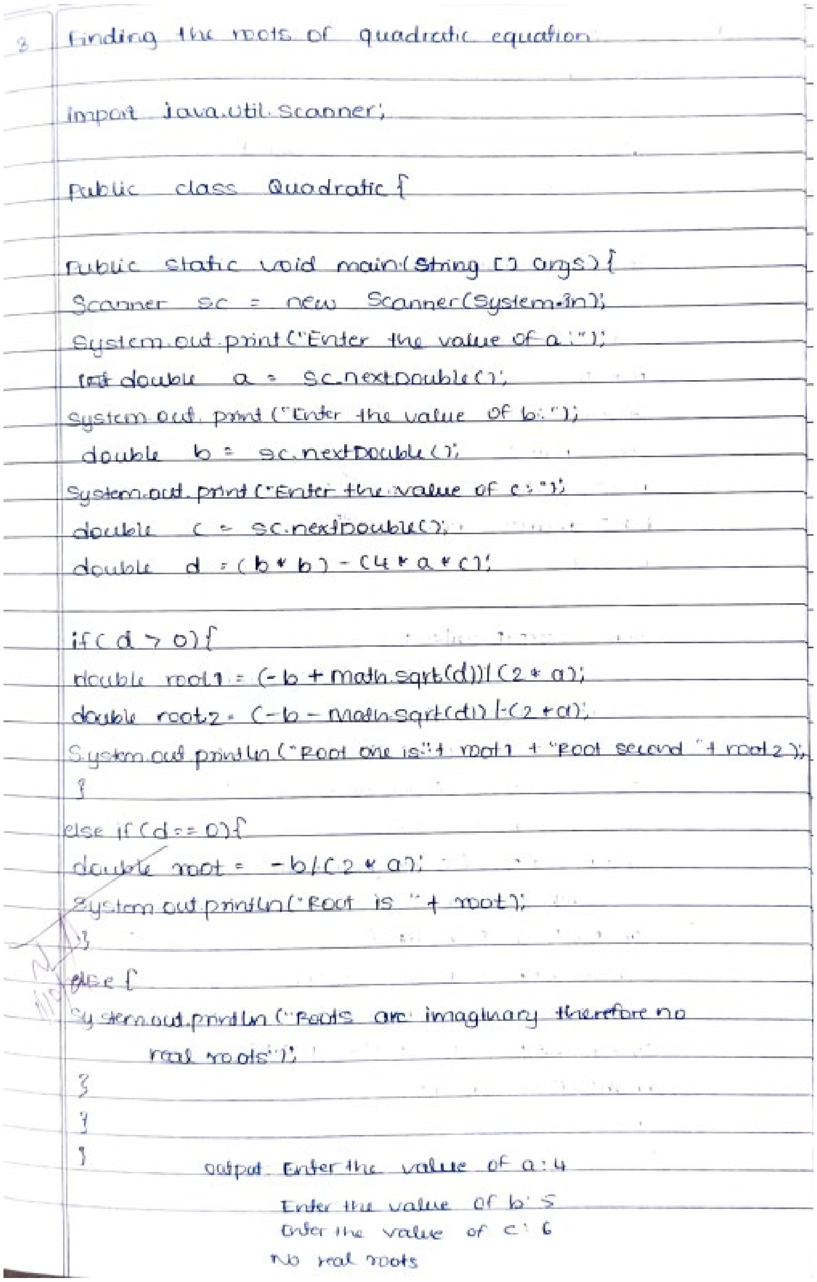
GitHub Link:
https://github.com/Hitish-Rao-P/JAVA_LAB_1BM23CS116

PROGRAM 1: Implement Quadratic Equation

ALGORITHM:



3 Finding the roots of quadratic equation

```
import java.util.Scanner;

Public class Quodratic {

Public static void main(String [] args){
Scanner sc = new Scanner(System.in);
System.out.print("Enter the value of a:");
~~int~~ double a = sc.nextDouble();
System.out. print ("Enter the value of b:");
double b = sc.nextDouble();
System.out. print ("Enter the value of c:");
double c = sc.nextDouble();
double d =(b*b)-(4*a*c);

if(d > 0){
double root1 = (-b + math.sqrt(d))/(2 * a);
double root2 = (-b - Math.sqrt(d))/(2 *a);
System.out.println ("Root one is:"+ root1 + "Root second "+ root2);
}
else if(d==0){
double root = -b/(2 * a);
System.out.println("Root is "+ root);
}
else{
System.out.println ("Roots are imaginary therefore no
        real roots");
}
}
}
```

```
output  Enter the value of a: 4
        Enter the value of b: 5
        Enter the value of c: 6
        No real roots
```

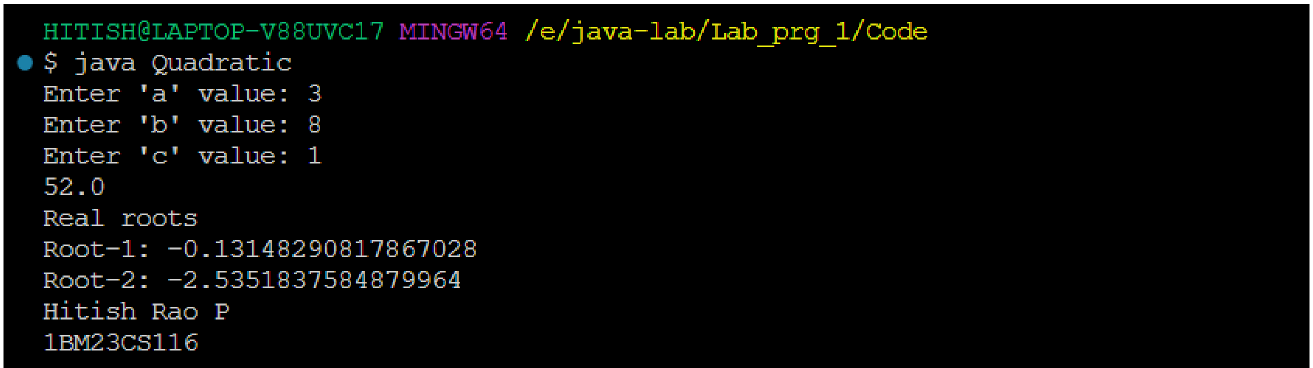
CODE:

import java.util.Scanner;

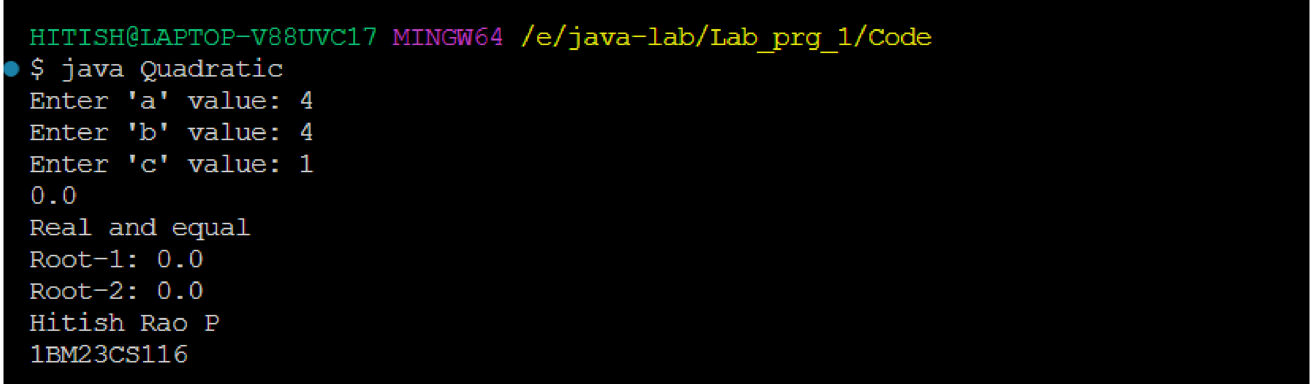
```
public class Quadratic

{
  public static void main(String[] args)
  {
    int a;
    int b;
    int c;
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter 'a' value: ");
    a= sc.nextInt();
    System.out.print("Enter 'b' value: ");
    b=sc.nextInt();
    System.out.print("Enter 'c' value: ");
    c=sc.nextInt();
    float disc = ((b*b)-4*a*c);
    System.out.println(disc);
    if (a==0)
    {
      System.out.println("Not Quadratic");
    }
    else
    {
      if (disc<0)
      {
      System.out.println("No real roots ");
      }
      else if (disc>0)
      {
      double root1= (-b + Math.sqrt(disc))/(2*a);
      double root2= (-b - Math.sqrt(disc))/(2*a);
      System.out.println("Real roots ");
      System.out.println("Root-1: "+root1);
      System.out.println("Root-2: "+root2);
      }
      else
      {
      double root1=(-b)/(2*a);
       System.out.println("Real and equal");
      System.out.println("Root-1: "+root1);
```

```
            System.out.println("Root-2: "+root1);
            }
          System.out.println("Hitish Rao P");
          System.out.println("1BM23CS116");

        }
    }
}
```

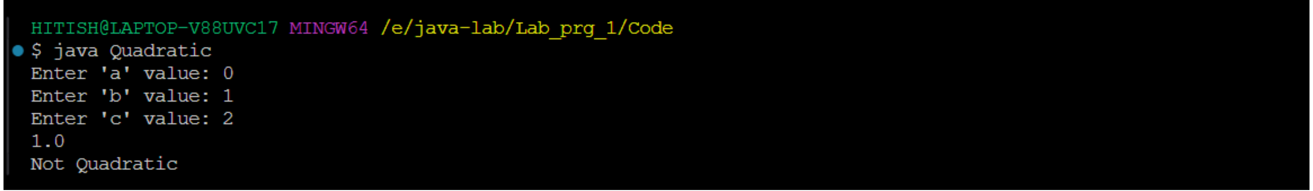
OUTPUT:



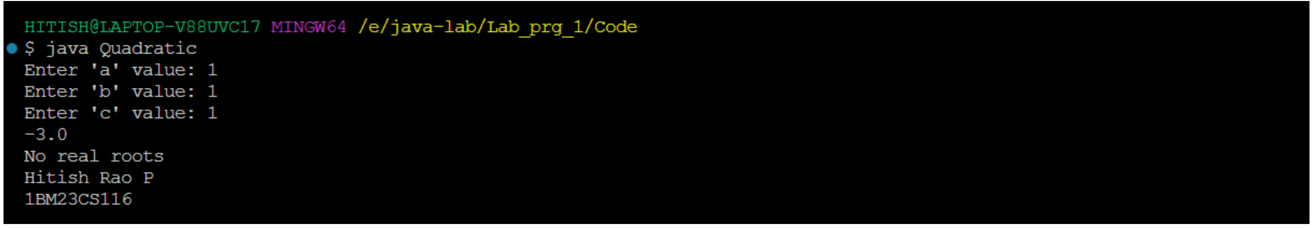
```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_1/Code
$ java Quadratic
Enter 'a' value: 3
Enter 'b' value: 8
Enter 'c' value: 1
52.0
Real roots
Root-1: -0.13148290817867028
Root-2: -2.5351837584879964
Hitish Rao P
1BM23CS116
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_1/Code
$ java Quadratic
Enter 'a' value: 4
Enter 'b' value: 4
Enter 'c' value: 1
0.0
Real and equal
Root-1: 0.0
Root-2: 0.0
Hitish Rao P
1BM23CS116
```



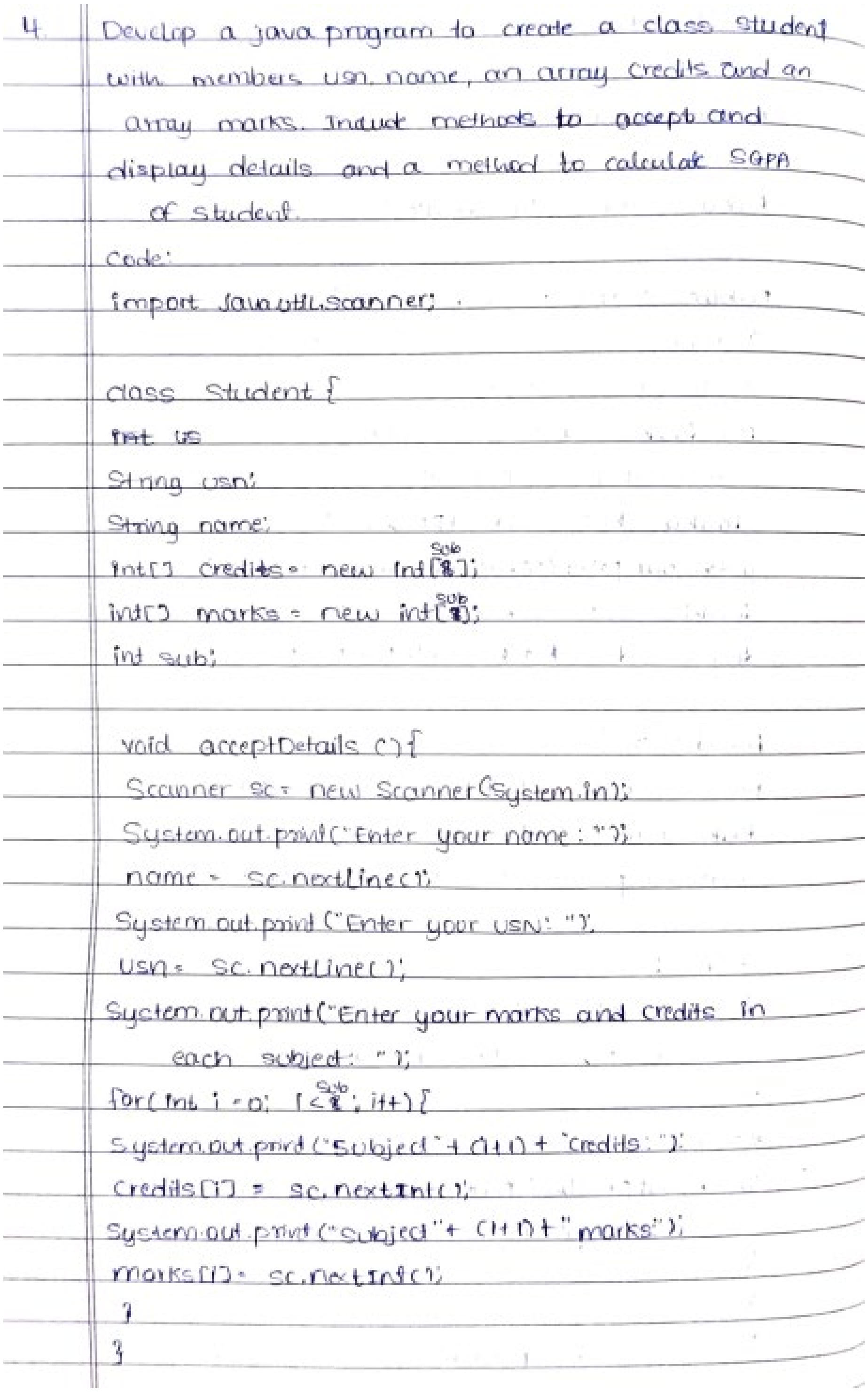
```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_1/Code
$ java Quadratic
Enter 'a' value: 0
Enter 'b' value: 1
Enter 'c' value: 2
1.0
Not Quadratic
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_1/Code
$ java Quadratic
Enter 'a' value: 1
Enter 'b' value: 1
Enter 'c' value: 1
-3.0
No real roots
Hitish Rao P
1BM23CS116
```

PROGRAM 2: SGPA Calculator

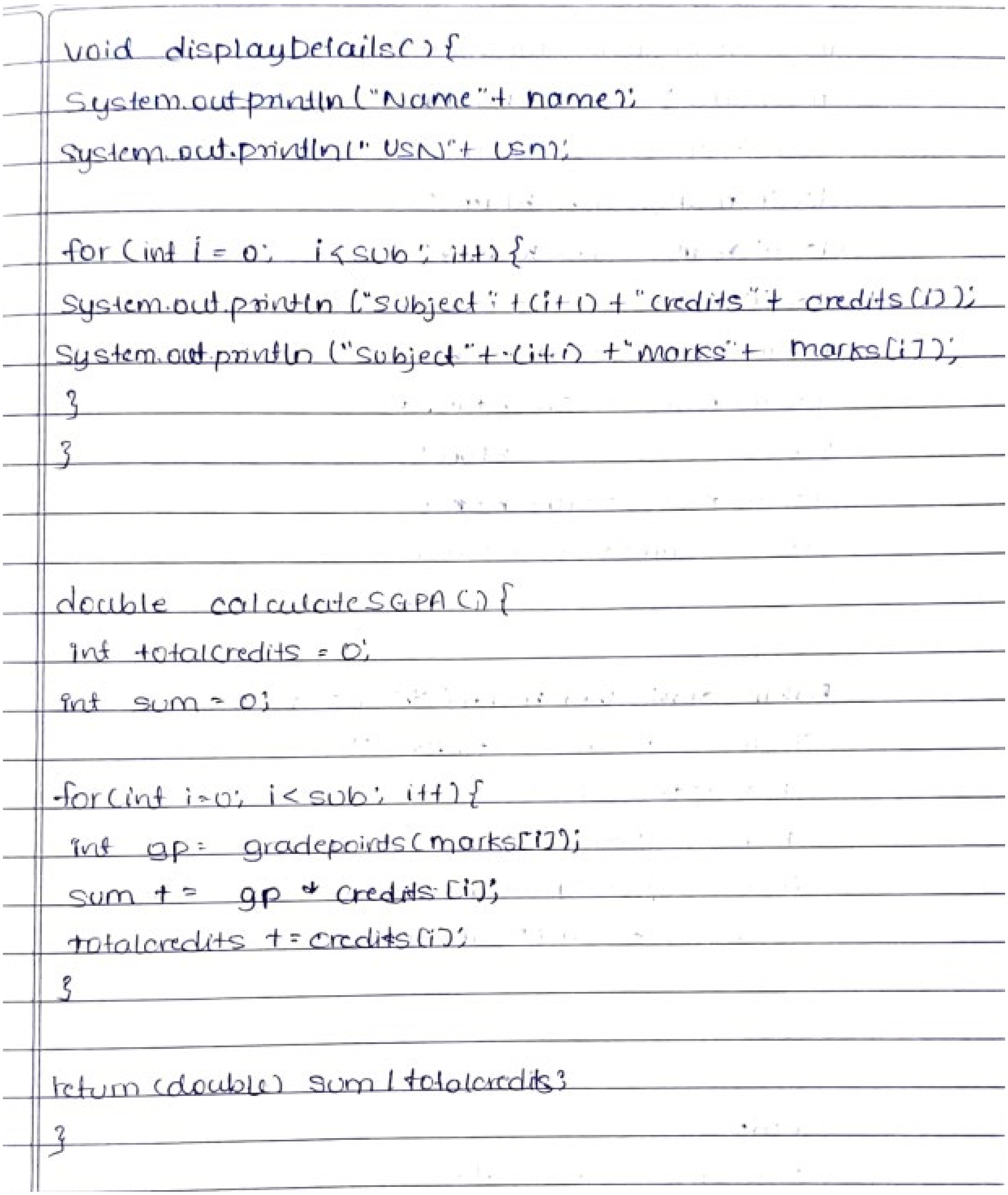
ALGORITHM:



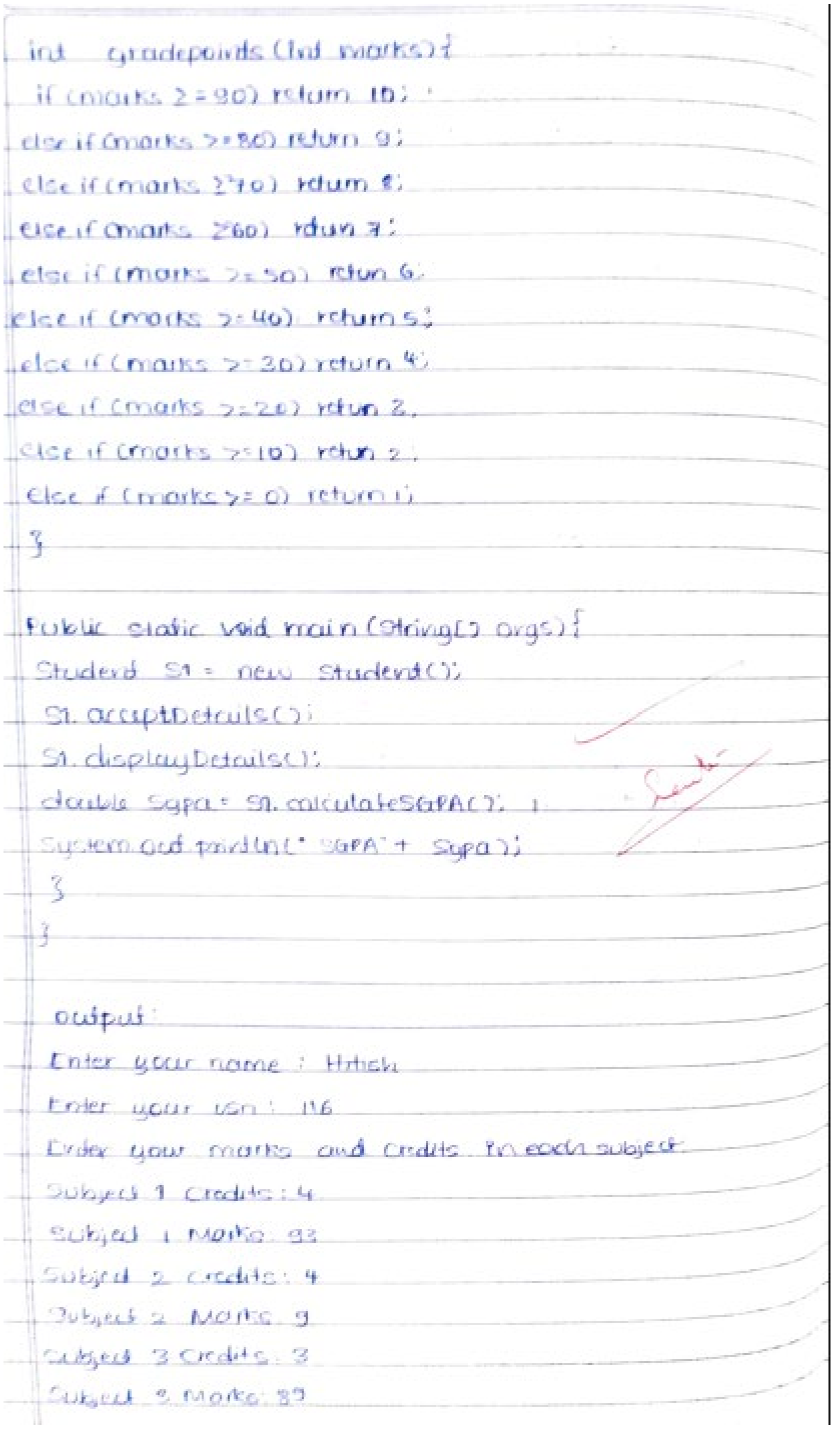
4. Develop a java program to create a class student with members usn, name, an array credits and an array marks. Induct methods to accept and display details and a method to calculate SGPA of student.

Code:

```
import Java.util.scanner;

class Student {
~~int~~ us
String usn;
String name;
int[] credits = new int[~~8~~ sub];
int[] marks = new int[~~8~~ sub];
int sub;

 void acceptDetails (){
 Scanner sc = new Scanner(System.in);
 System.out.print("Enter your name : ");
 name = sc.nextLine();
System.out.print ("Enter your USN: ");
 usn = sc.nextLine();
System.out.print("Enter your marks and credits in
     each subject: ");
for(int i = 0; i < ~~8~~ sub; i++){
System.out.print ("Subject" + (i+1) + "credits: ");
credits[i] = sc.nextInt();
System.out.print ("subject" + (i+1) + "marks");
marks[i] = sc.nextInt();
 }
}
```



```
void displayDetails(){
System.out.println("Name"+ name);
System.out.println(" USN"+ usn);

for(int i = 0; i<sub; i++){
System.out.println ("subject"+(i+1) + "credits"+ credits(i));
System.out.println ("subject"+ (i+1) +"marks"+ marks[i]);
}
}


double calculateSGPA(){
int totalCredits = 0;
int sum = 0;

for(int i=0; i<sub; i++){
int gp= gradepoints(marks[i]);
sum += gp * credits[i];
totalcredits += credits[i];
}

return (double) sum / totalcredits;
}
```



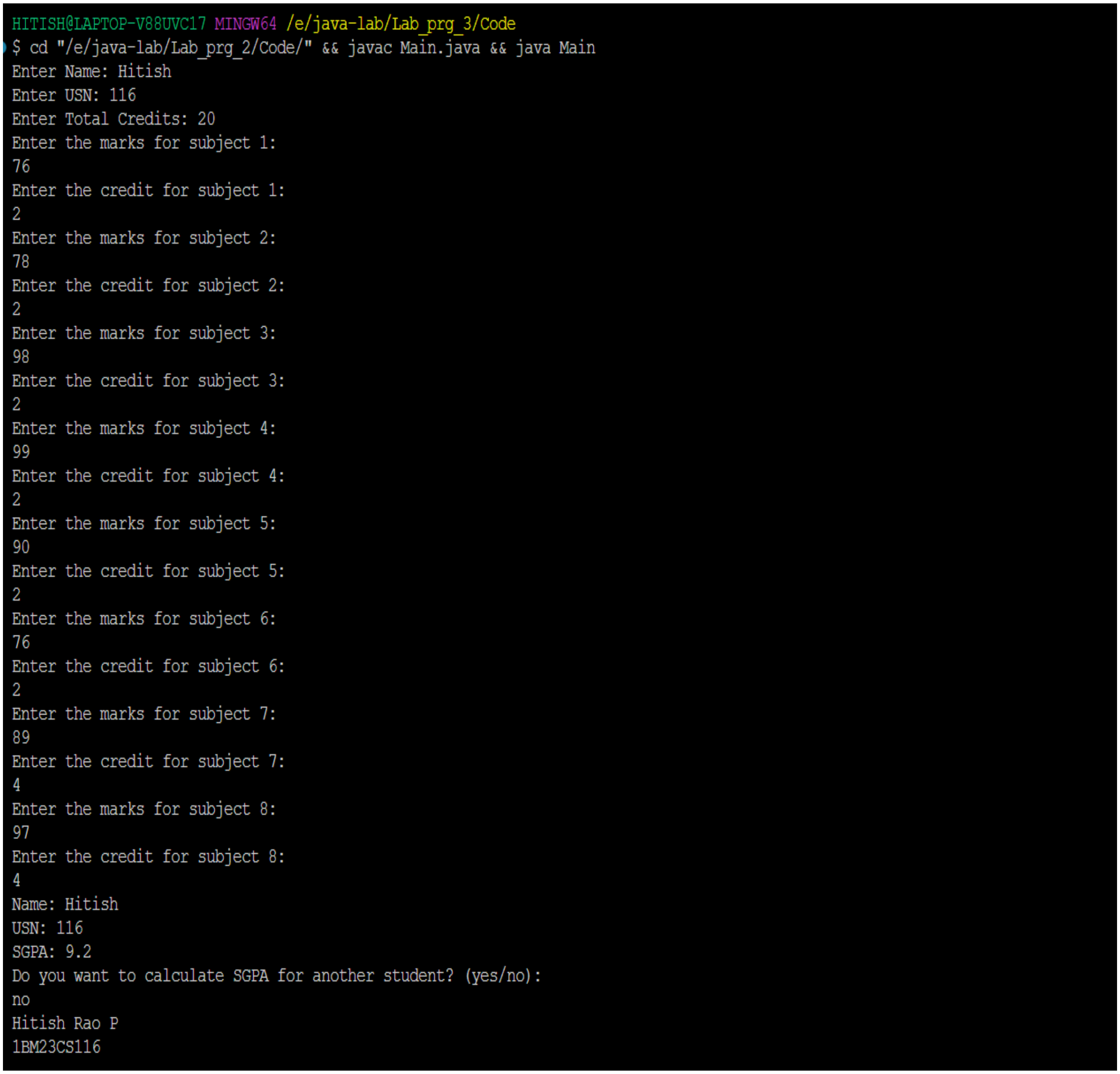
```
int gradepoints(Int marks){
 if (marks >=90) return 10;
else if(marks >=80) return 9;
else if(marks ≥70) return 8;
else if(marks ≥60) return 7;
else if (marks >=50) return 6;
else if (marks >=40) return 5;
else if (marks >=30) return 4;
else if (marks >=20) return 2.
else if (marks >=10) return 2;
Else if (marks >= 0) return 1;
}

Public static void main(String[] args){
 Student S1 = new Student();
 S1.acceptDetails();
 S1.displayDetails();
 double sgpa = S1.calculateSGPA();
 System.out.println(" SGPA" + sgpa);
 }
}
```

output:

```
Enter your name : Hritish
Enter your usn : 116
Enter your marks and credits in each subject
Subject 1 Credits : 4
Subject 1 Marks: 93
Subject 2 credits: 4
Subject 2 Marks 9
Subject 3 Credits: 3
Subject 3 Marks: 89
```

CODE:

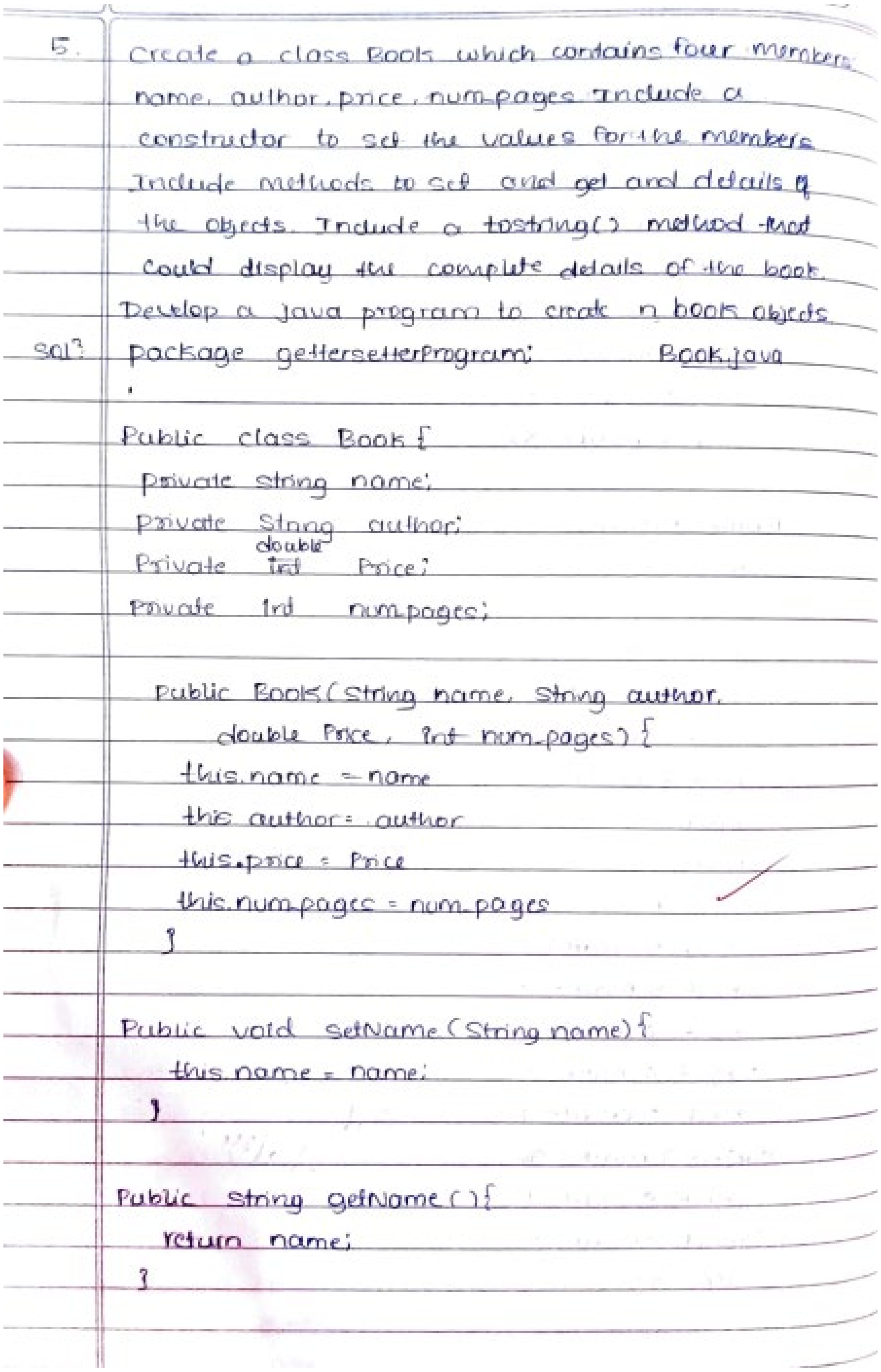
```
import java.util.Scanner;

class Student {
   private String name;
private String usn;
private double total_credit;
private double[] marks;
private Scanner sc = new Scanner(System.in);

void getInfo() {
    System.out.print("Enter Name: ");
    name = sc.nextLine();

    System.out.print("Enter USN: ");
    usn = sc.nextLine();

    System.out.print("Enter Total Credits: ");
    total_credit = sc.nextDouble();
    sc.nextLine();
}

double grade(double mark) {
    if (mark <= 39) {
        return 0;
    } else if (mark >= 40 && mark <= 49) {
        return 4;
    } else if (mark >= 50 && mark <= 54) {
        return 5;
    } else if (mark >= 55 && mark <= 59) {
        return 6;
    } else if (mark >= 60 && mark <= 69) {
        return 7;
    } else if (mark >= 70 && mark <= 79) {
        return 8;
    } else if (mark >= 80 && mark <= 89) {
        return 9;
    } else {
        return 10;
    }
}

void getMarks() {
    marks = new double[8];
    for (int i = 0; i < 8; i++) {
            System.out.println("Enter the marks for subject " + (i + 1) + ": ");
            double mark = sc.nextDouble();

            System.out.println("Enter the credit for subject " + (i + 1) + ": ");
            double credit = sc.nextDouble();

            double grade = grade(mark);
            marks[i] = grade * credit;
        }
        sc.nextLine();
    }

    void calSgpa() {
        double totalMarks = 0;
        for (int i = 0; i < 8; i++) {
            totalMarks += marks[i];
        }
        System.out.println("Name: " + name);
        System.out.println("USN: " + usn);
        System.out.println("SGPA: " + (totalMarks / total_credit));
    }
}

public class Main {
    public static void main(String args[]) {
        boolean cond = true;
        Scanner sc = new Scanner(System.in);
        while (cond) {
            Student s1 = new Student();


            s1.getInfo();
            s1.getMarks();
            s1.calSgpa();

            System.out.println("Do you want to calculate SGPA for another student?
(yes/no): ");
            String check = sc.nextLine();
            if (check.equalsIgnoreCase("yes")) {
                continue;
            } else {
                cond = false;
            }
        }
          System.out.println("Hitish Rao P");
        System.out.println("1BM23CS116");
        sc.close();
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_3/Code
$ cd "/e/java-lab/Lab_prg_2/Code/" && javac Main.java && java Main
Enter Name: Hitish
Enter USN: 116
Enter Total Credits: 20
Enter the marks for subject 1:
76
Enter the credit for subject 1:
2
Enter the marks for subject 2:
78
Enter the credit for subject 2:
2
Enter the marks for subject 3:
98
Enter the credit for subject 3:
2
Enter the marks for subject 4:
99
Enter the credit for subject 4:
2
Enter the marks for subject 5:
90
Enter the credit for subject 5:
2
Enter the marks for subject 6:
76
Enter the credit for subject 6:
2
Enter the marks for subject 7:
89
Enter the credit for subject 7:
4
Enter the marks for subject 8:
97
Enter the credit for subject 8:
4
Name: Hitish
USN: 116
SGPA: 9.2
Do you want to calculate SGPA for another student? (yes/no):
no
Hitish Rao P
1BM23CS116
```

PROGRAM 3: Method overriding

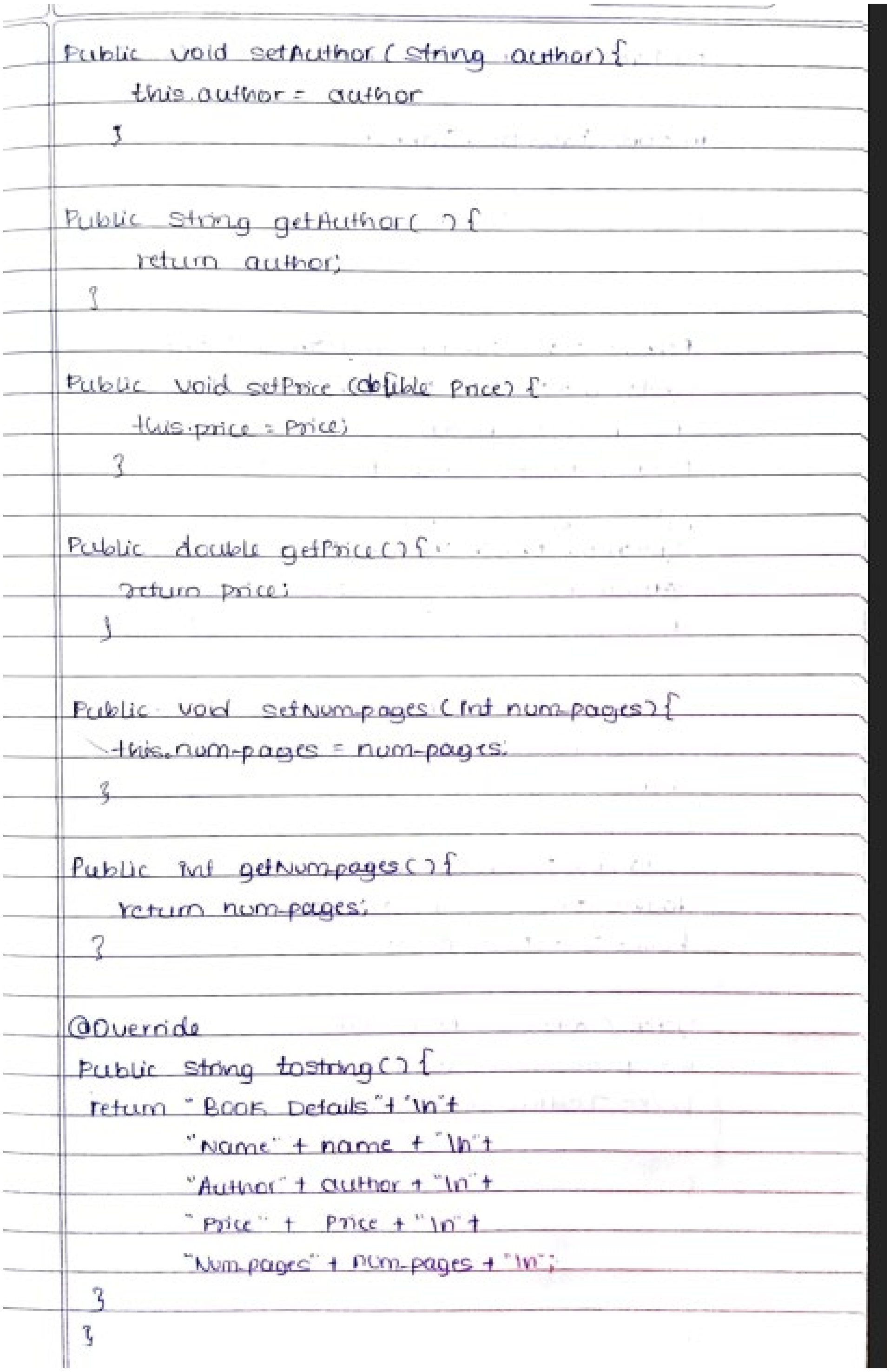
ALGORITHM:



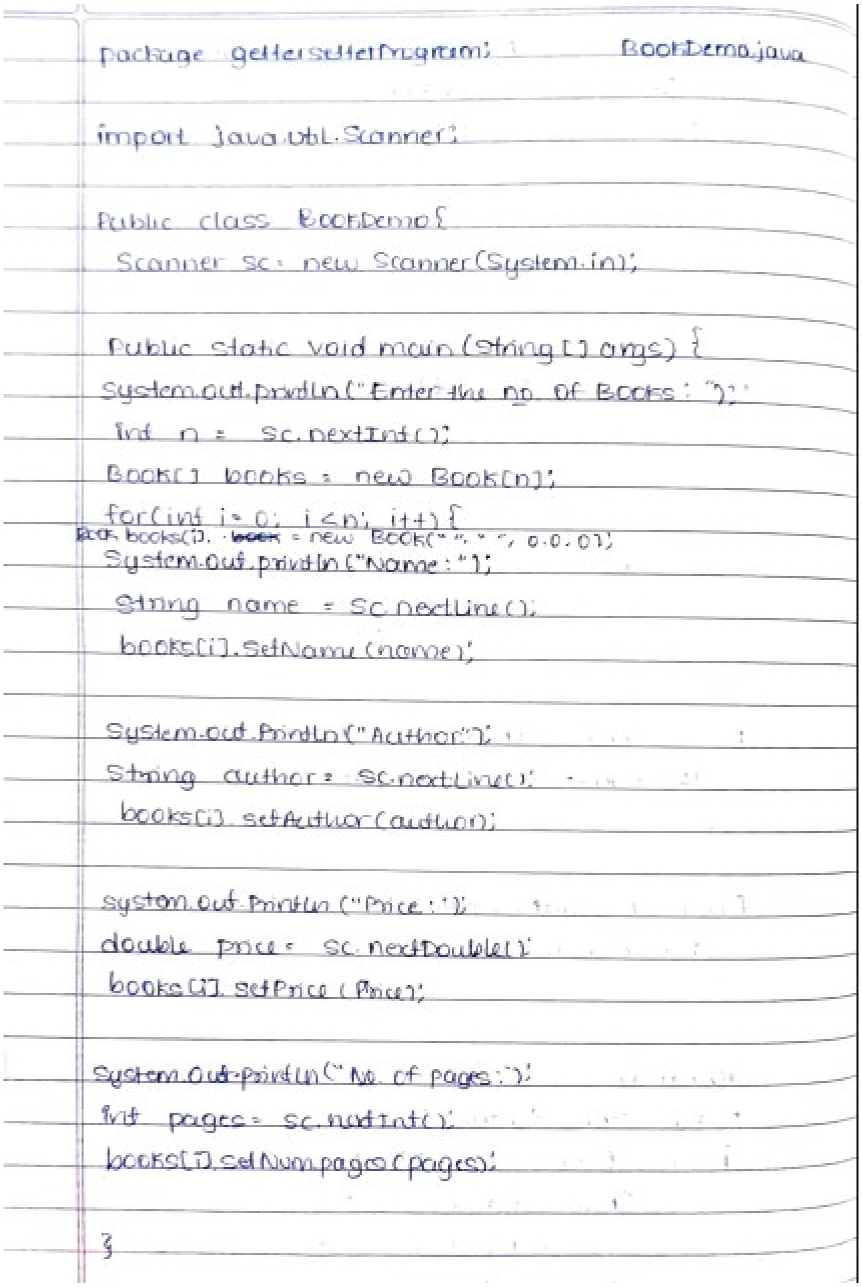
5. Create a class Books which contains four members name, author, price, num-pages Include a constructor to set the values for the members Include methods to set and get and details of the objects. Include a tostring() method that could display the complete details of the book. Develop a Java program to create n books objects

sol? package gettersetterProgram;   Book.java

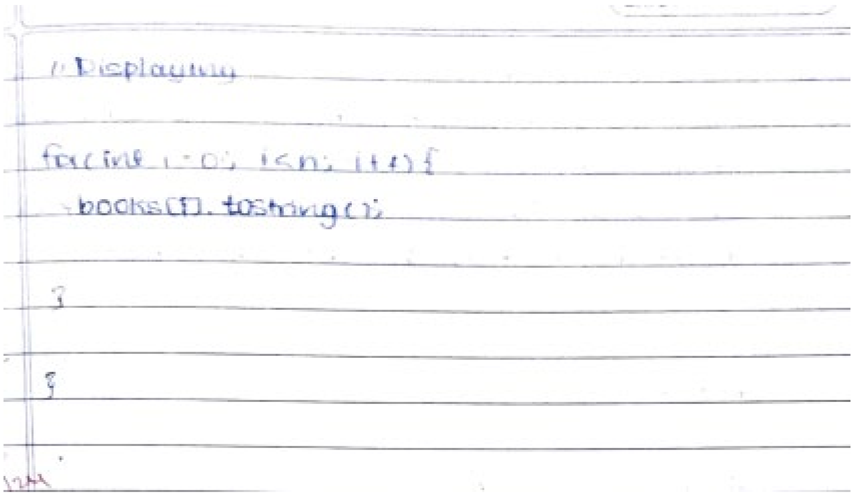
```
Public class Book {
 Private string name;
 Private String author;
 Private ~~int~~ double Price;
 Private int numpages;

  Public Books(String name, String author,
     double Price, int num_pages){
    this.name = name
    this.author= author
    this.price = Price
    this.numpages = num_pages
   }

Public void setName(String name){
   this.name = name;
 }

Public string getName(){
  return name;
 }
```



```
Public void setAuthor ( String author){
    this.author = author
  }

Public String getAuthor( ){
    return author;
 }

Public void setPrice (double Price) {
    this.price = Price;
  }

Public double getPrice(){
   return price;
 }

Public void setNum_pages (int num_pages){
  this.num_pages = num_pages;
 }

Public int getNumpages(){
   return num_pages;
 }

@Override
 Public String toString(){
 return "BOOK Details"+"\n"+
          "Name" + name + "\n"+
          "Author" + author + "\n"+
          "Price" + Price + "\n"+
          "Num_pages" + num_pages + "\n";
 }
 }
```



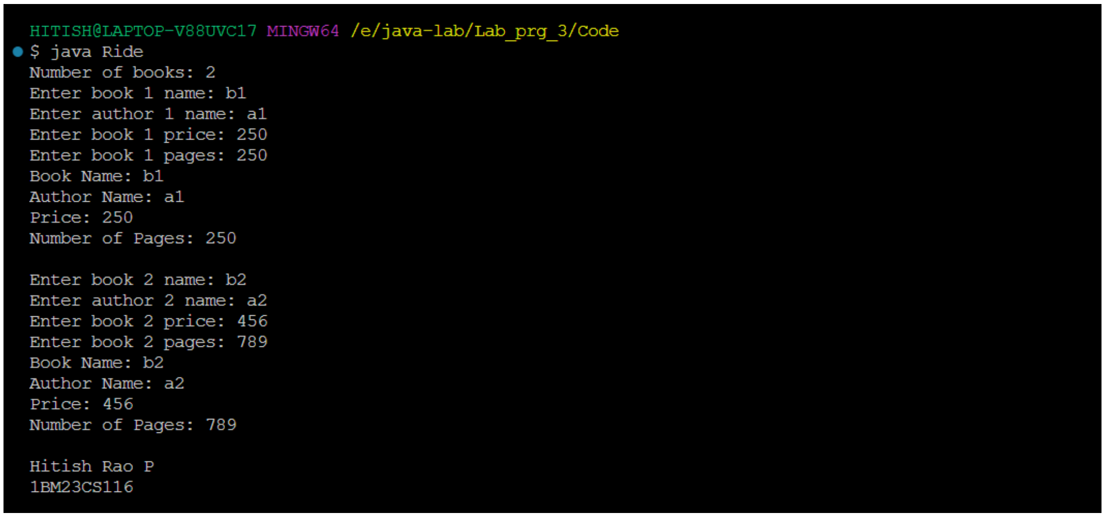
```
package getterSetterProgram;                    BookDemo.java

import java.util.Scanner;

Public class BookDemo{
 Scanner sc = new Scanner(System.in);

 Public static void main(String[] args) {
 System.out.println("Enter the no. Of Books : ");
  int n =  sc.nextInt();
 Book[] books = new Book[n];
 for(int i = 0; i<n; i++){
Book books[i]. ~~book~~ = new Book(" ", " ", 0.0.0);
 System.out.println("Name : ");
  String name = sc.nextLine();
  books[i].setName(name);

 System.out.Println("Author:");
 String author = sc.nextLine();
  books[i].setAuthor(author);

 system.out.Println("Price : ");
 double price = sc.nextDouble();
 books[i].setPrice (Price);

System.out.println(" No. of pages:");
int pages = sc.nextInt();
books[i].setNumpages(pages);

}
```



```
// Displaying

for(int i=0; i<n; i++){
  books[i].toString();

}

}
```

CODE:

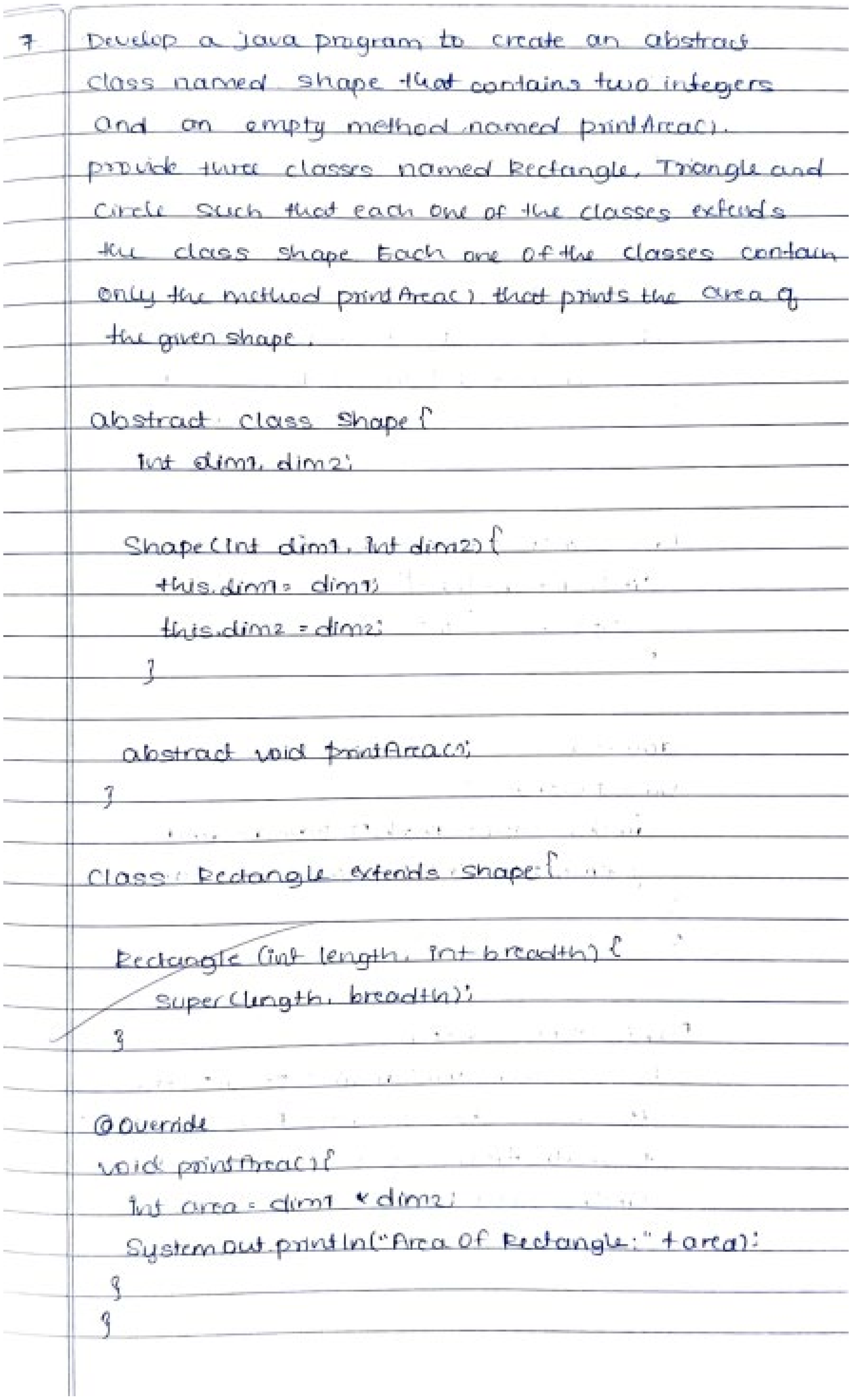
```
import java.util.Scanner;

class Book {
   public String book_name;
   public String author_name;
   public int price;
   public int num_pages;

   Book(String book_name, String author_name, int price, int num_pages) {
      this.book_name = book_name;
      this.author_name = author_name;
      this.price = price;
      this.num_pages = num_pages;
   }

   @Override
   public String toString() {
      String name, author, price, numPages;
      name = "Book Name: " + this.book_name + "\n";
      author = "Author Name: " + this.author_name + "\n";
      price = "Price: " + this.price + "\n";
      numPages = "Number of Pages: " + this.num_pages + "\n";
      return name + author + price + numPages;
   }
}public class ride {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Number of books: ");
        int count = sc.nextInt();
        sc.nextLine();

        Book[] arr = new Book[count];
        for (int i = 0; i < count; i++) {
            System.out.print("Enter book " + (i + 1) + " name: ");
            String name = sc.nextLine();
            System.out.print("Enter author " + (i + 1) + " name: ");
            String author = sc.nextLine();
            System.out.print("Enter book " + (i + 1) + " price: ");
            int price = sc.nextInt();
            System.out.print("Enter book " + (i + 1) + " pages: ");
            int pages = sc.nextInt();
            sc.nextLine();

            arr[i] = new Book(name, author, price, pages);
            System.out.println(arr[i]);
        }

        sc.close();

        System.out.println("Hitish Rao P");
        System.out.println("1BM23CS116");
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_3/Code
● $ java Ride
Number of books: 2
Enter book 1 name: b1
Enter author 1 name: a1
Enter book 1 price: 250
Enter book 1 pages: 250
Book Name: b1
Author Name: a1
Price: 250
Number of Pages: 250

Enter book 2 name: b2
Enter author 2 name: a2
Enter book 2 price: 456
Enter book 2 pages: 789
Book Name: b2
Author Name: a2
Price: 456
Number of Pages: 789

Hitish Rao P
1BM23CS116
```

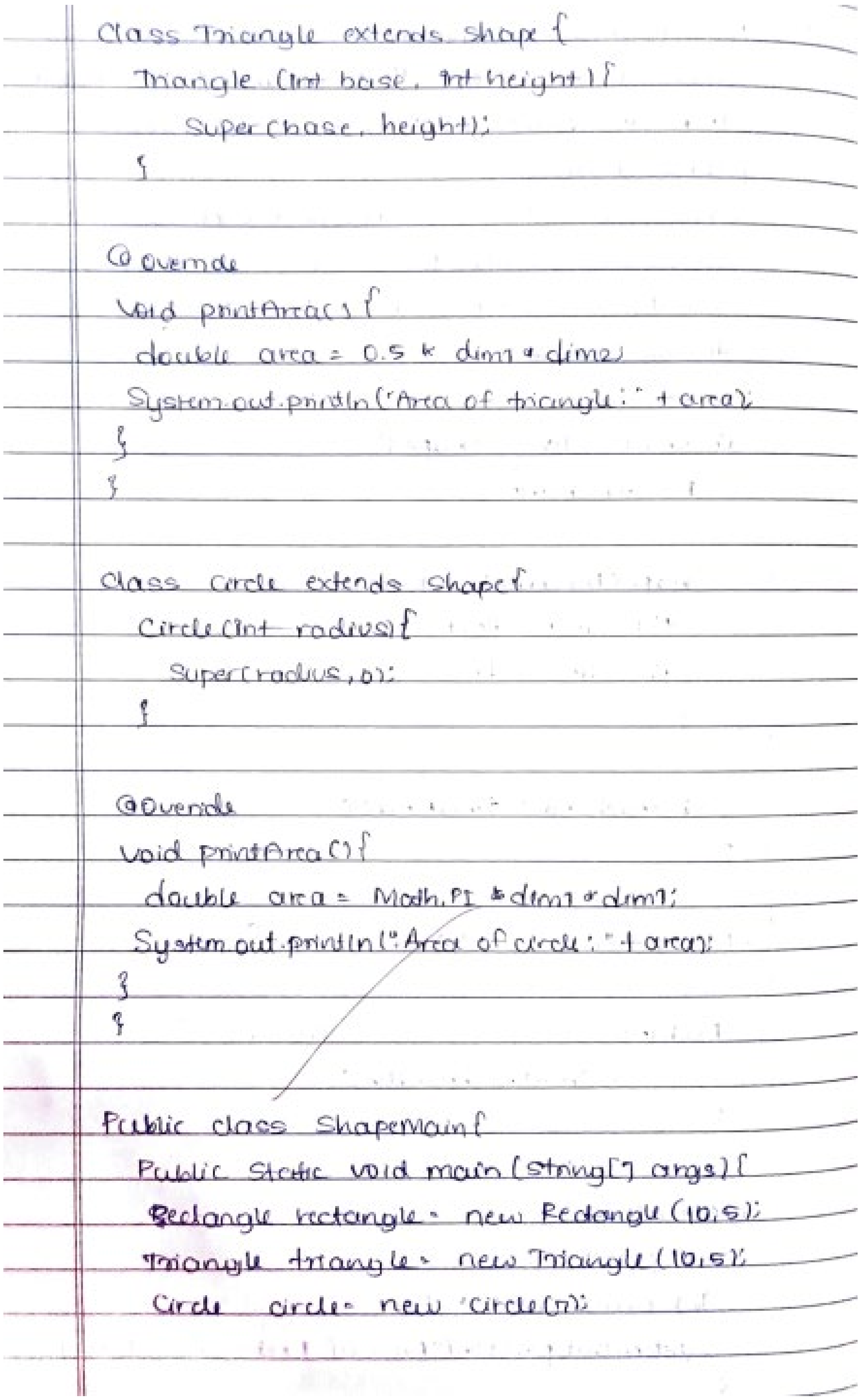
PROGRAM 4: Abstract Classes

ALGORITHM:

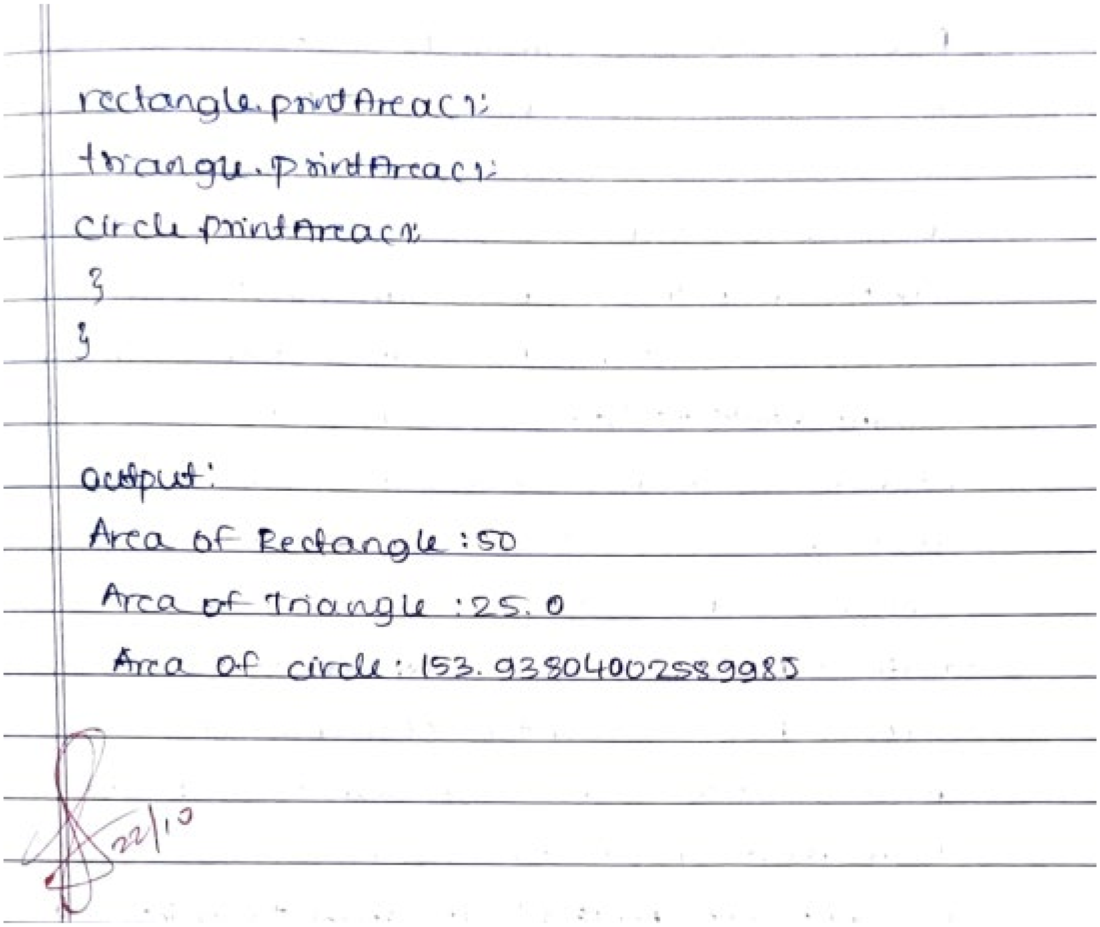


7 Develop a java program to create an abstract class named shape that contains two integers and on empty method named printArea(). provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class shape Each one of the classes contain only the method printArea() that prints the area of the given shape.

```
abstract class Shape{
   Int dim1, dim2;

  Shape(Int dim1, Int dim2){
    this.dim1= dim1;
     this.dim2 = dim2;
   }

  abstract void printArea();
 }

Class Rectangle extends Shape{

 Rectangle (int length, int breadth){
   Super(length, breadth);
 }

@Override
void printArea(){
  Int area = dim1 * dim2;
  System.out.println("Area Of Rectangle:" +area);
 }
}
```



```
Class Triangle extends shape {
  Triangle (int base, int height){
     super(base, height);
  }

 @Override
 void printArea(){
  double area = 0.5 * dim1 * dim2;
  System.out.println("Area of triangle:" + area);
 }
}

Class circle extends shape{
  Circle(int radius){
    super(radius,0);
  }

 @Override
 void printArea(){
  double area = Math.PI * dim1 * dim1;
  System.out.println("Area of circle: " + area);
 }
}

Public class ShapeMain{
  Public Static void main (String[] args){
   Rectangle rectangle = new Rectangle (10,5);
   Triangle triangle = new Triangle (10,5);
   Circle   circle = new Circle(7);
```



```
rectangle.printArea();
triangle.printArea();
circle.printArea();
 }
}

output:
Area of Rectangle :50
 Area of Triangle :25.0
  Area of circle: 153.93804002589985
```

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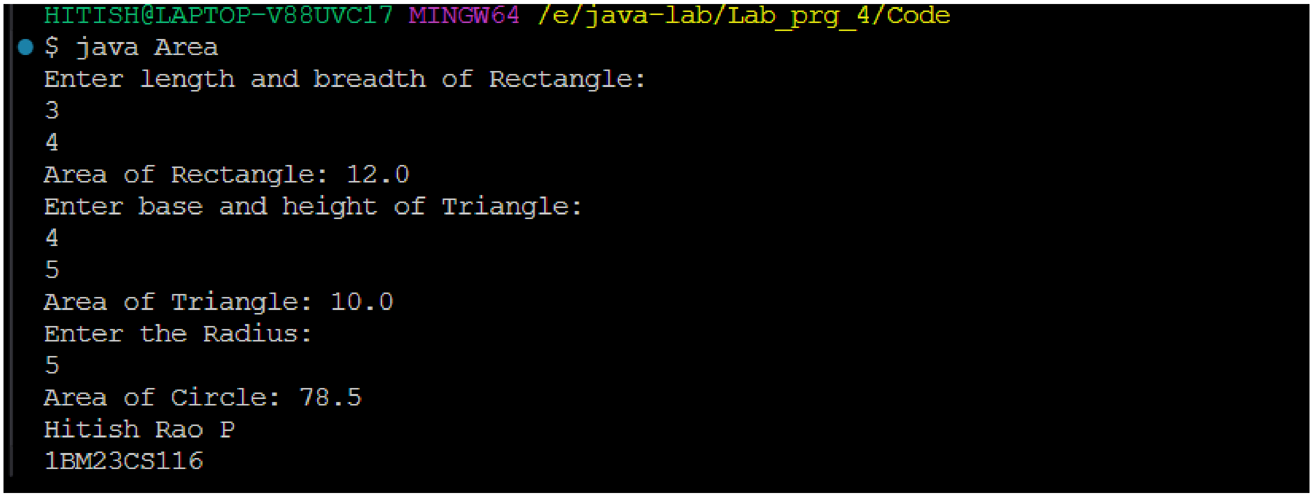
CODE:

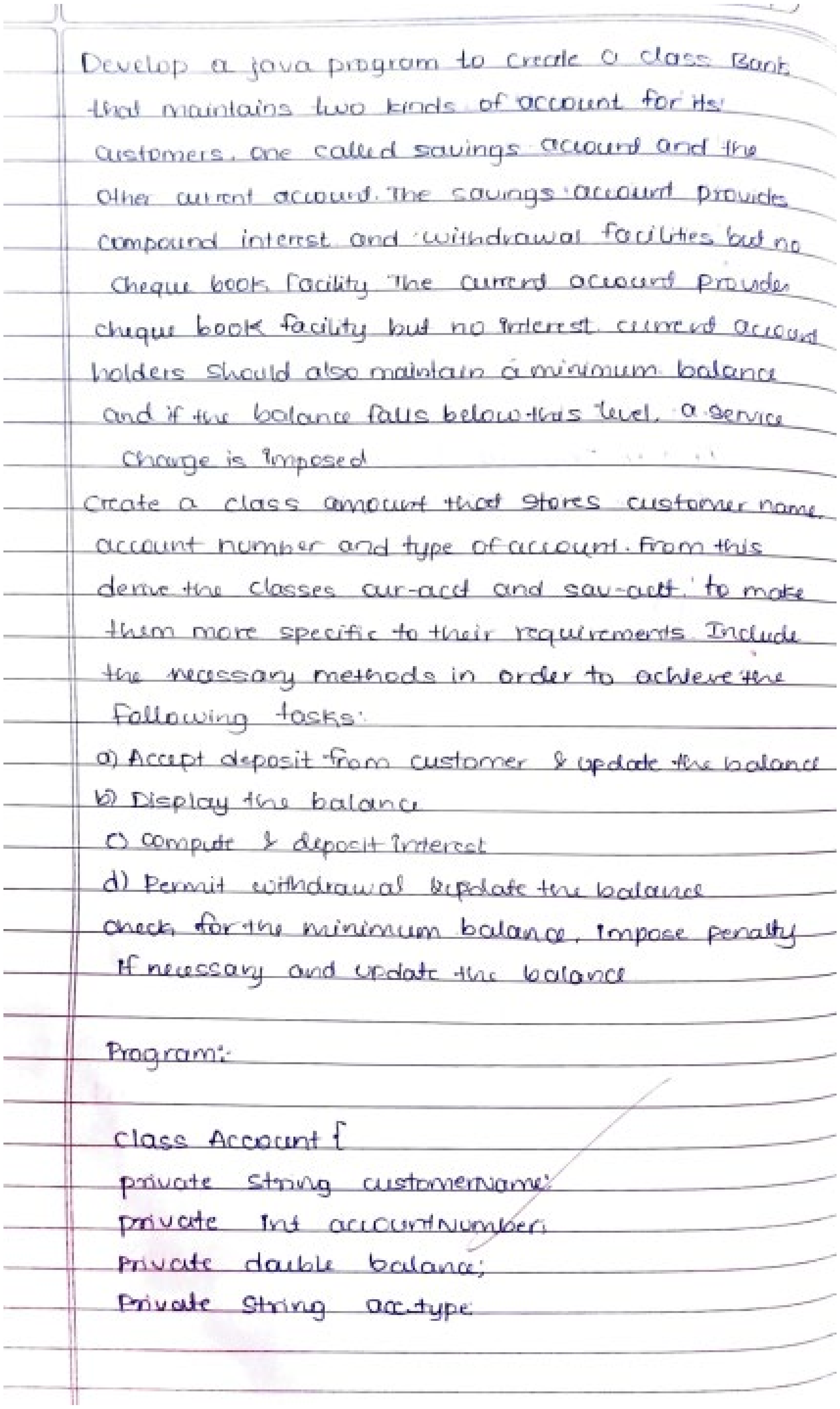
```
import java.util.Scanner;

abstract class Shape {
    double dim1;
    double dim2;

    abstract void printarea();
}

class Rectangle extends Shape {
    Rectangle(double d1, double d2) {
        this.dim1 = d1;
        this.dim2 = d2;
    }
    @Override
    void printarea() {
        double area = dim1 * dim2;
        System.out.println("Area of Rectangle: " + area);
    }
}

class Triangle extends Shape {
    Triangle(double base, double height) {
        this.dim1 = base;
        this.dim2 = height;
    }

    @Override
    void printarea() {
        double area = 0.5 * dim1 * dim2;
        System.out.println("Area of Triangle: " + area);
    }
}

class Circle extends Shape {
    Circle(double radius) {
        this.dim1 = radius;
    }

    @Override
    void printarea() {
        double area = 3.14 * dim1 * dim1;
        System.out.println("Area of Circle: " + area);
    }
}

public class area {
    public static void main(String[] args) {
        try (Scanner sc = new Scanner(System.in)) {
            System.out.println("Enter length and breadth of Rectangle:");
            double rl = sc.nextDouble();
            double rb = sc.nextDouble();
            Rectangle r1 = new Rectangle(rl, rb);
            r1.printarea();
            System.out.println("Enter base and height of Triangle:");
            double base = sc.nextDouble();
            double height = sc.nextDouble();
            Triangle t1 = new Triangle(base, height);
            t1.printarea();

            System.out.println("Enter the Radius:");
            double radius = sc.nextDouble();
            Circle c1 = new Circle(radius);
            c1.printarea();
        }

        System.out.println("Hitish Rao P");
        System.out.println("1BM23CS116");
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_4/Code
$ java Area
Enter length and breadth of Rectangle:
3
4
Area of Rectangle: 12.0
Enter base and height of Triangle:
4
5
Area of Triangle: 10.0
Enter the Radius:
5
Area of Circle: 78.5
Hitish Rao P
1BM23CS116
```

PROGRAM 5: Bank Account

ALGORITHM:



Develop a java program to create a class Bank that maintains two kinds of account for its customers. one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no Cheque book facility The current account provides cheque book facility but no interest. current account holders should also maintain a minimum balance and if the balance falls below this level, a service Charge is imposed

Create a class amount that stores customer name, account number and type of account. From this derive the classes cur-acct and sav-acct, to make them more specific to their requirements. Include the necessary methods in order to achieve the Following tasks:

a) Accept deposit from customer & update the balance

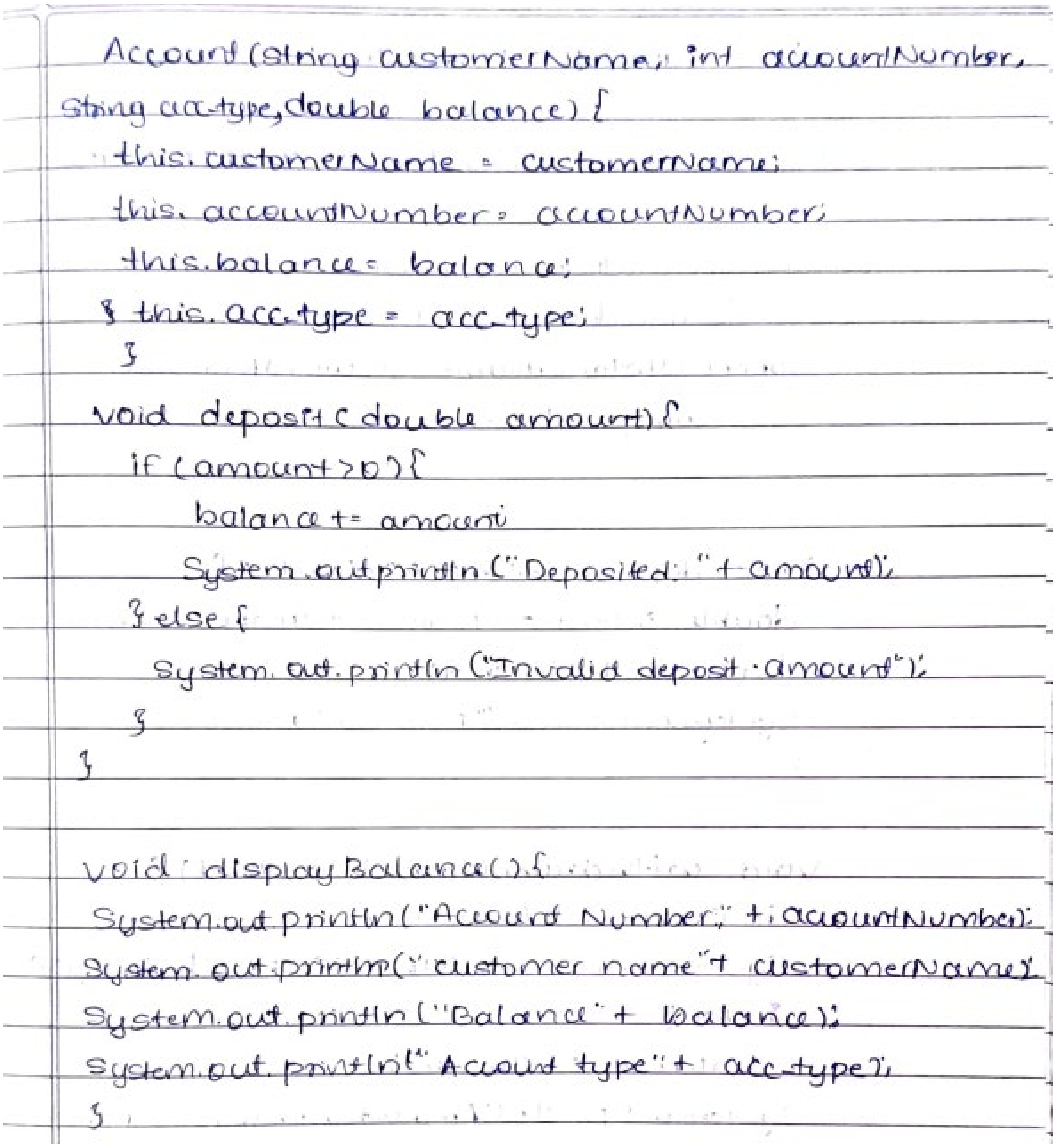
b) Display the balance

c) compute & deposit Interest

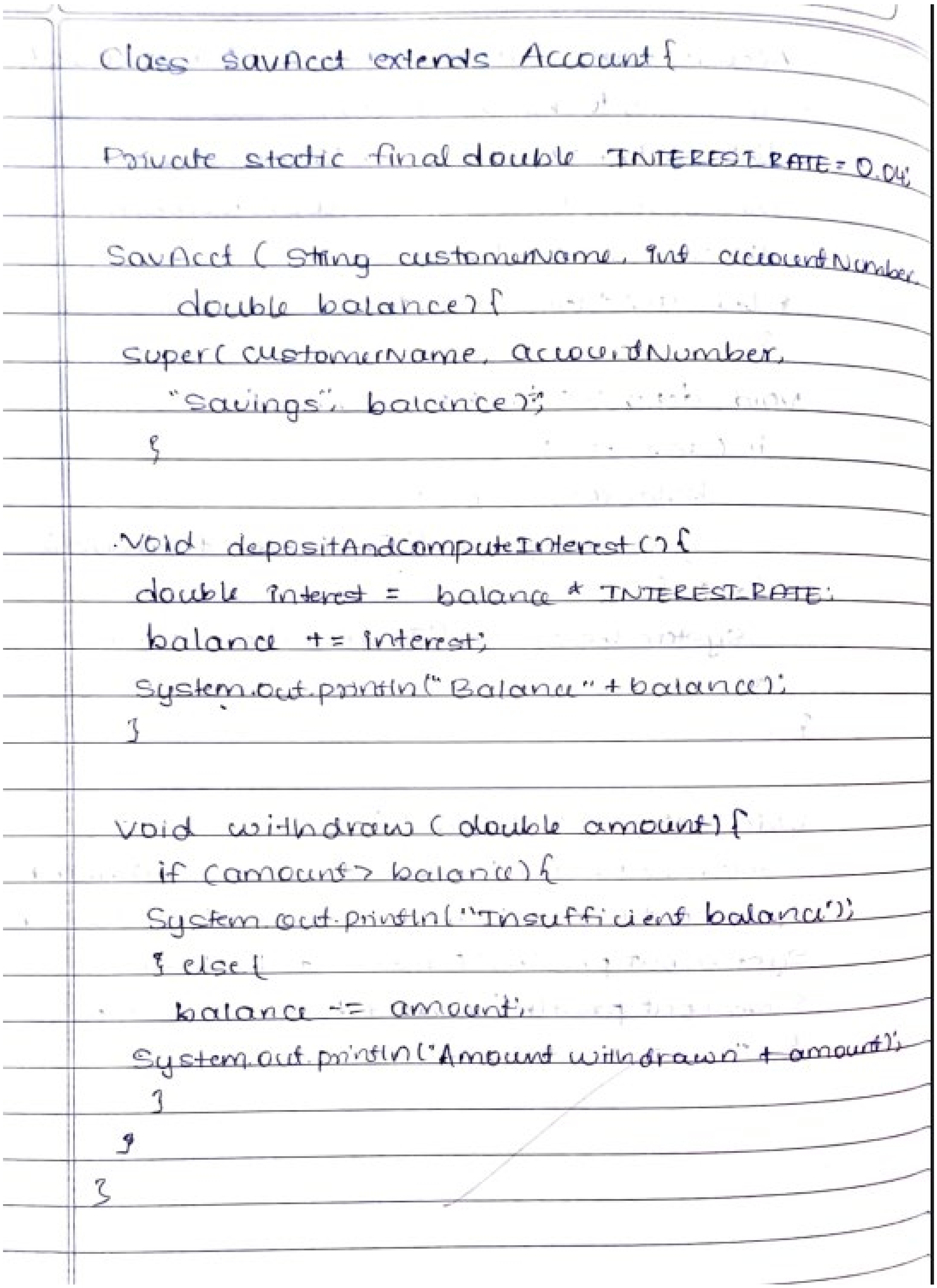
d) Permit withdrawal & update the balance check for the minimum balance, Impose penalty If necessary and update the balance

Program:

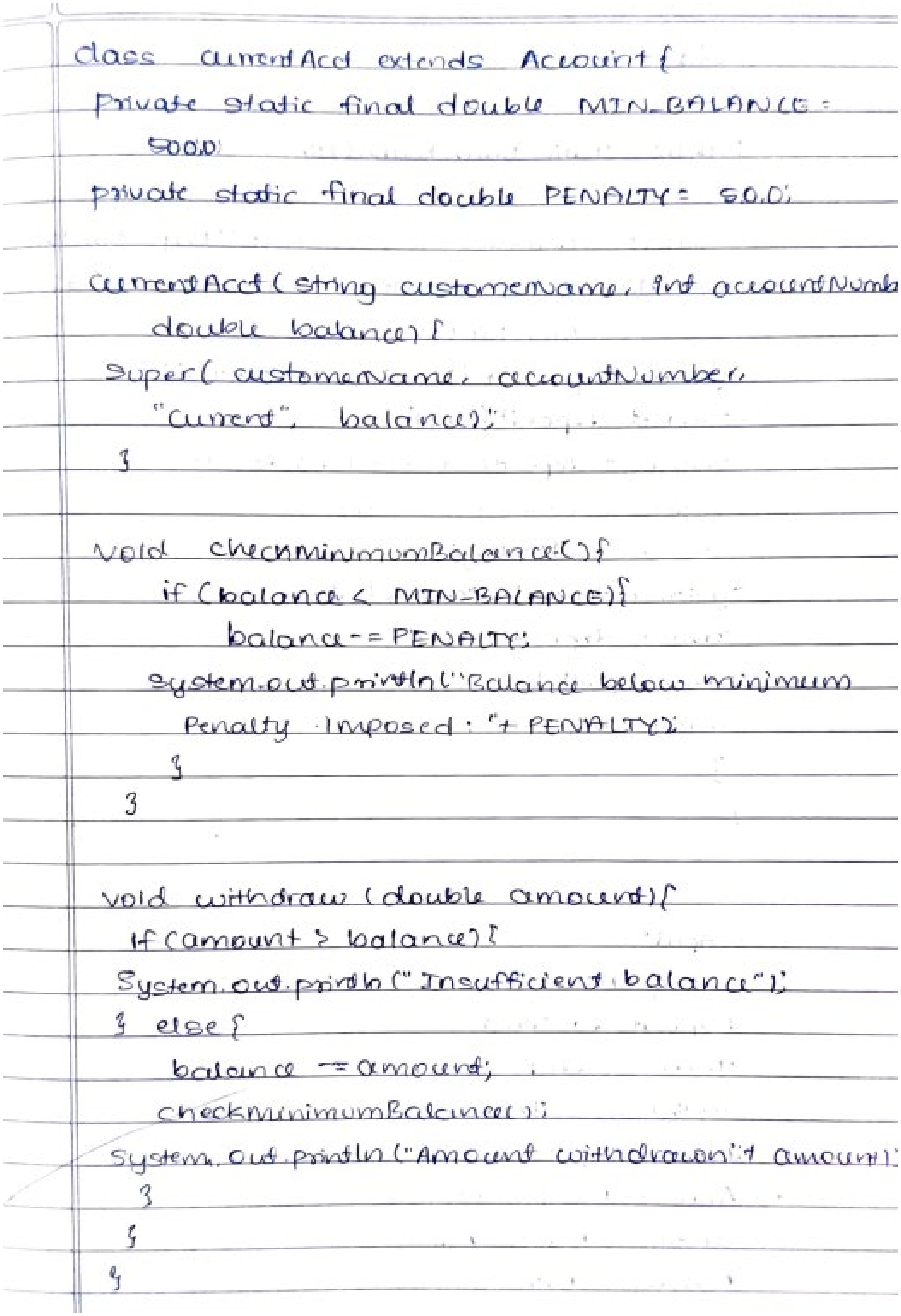
```
Class Account {
private String customerName;
private Int accountNumber;
Private double balance;
Private String acc-type
```



```
Account(String customerName, int accountNumber,
String acc_type,double balance) {
  this.customerName = customerName;
  this. accountNumber= accountNumber;
  this.balance= balance;
 } this.acc_type = acc_type;
  }

void deposit(double amount) {
  if (amount>0) {
      balance+= amount;
      System.out.println("Deposited: "+amount);
  }else {
     System.out.println("Invalid deposit amount");
  }
}


void displayBalance(){
System.out.println("Account Number:"+accountNumber);
System.out.println("customer name"+ customerName);
System.out.println("Balance"+ balance);
System.out.println("Account type"+ acc_type);
}
```



```
Class savAcct extends Account{

Private static final double INTEREST_RATE=0.04;

SavAcct ( String customerName, int accountNumber,
    double balance){
 super( customerName, accountNumber,
   "savings", balcince);
  }

.Void depositAndComputeInterest(){
 double interest = balance * INTEREST_RATE;
  balance += interest;
 System.out.println("Balance" +balance);
 }

void withdraw (double amount){
  if (amount> balance){
  System.out.println("Insufficient balance");
  }else{
   balance -= amount;
 System.out.println("Amount withdrawn" + amount);
  }
 }
}
```



```
class currentAcct extends Account{
 Private static final double MIN_BALANCE =
     5000.0;
 private static final double PENALTY = 50.0;

 currentAcct(String customerName, int accountNumb
     double balance){
  super( customerName, accountNumber,
     "current", balance);
  }

 void checkminimumBalance(){
     if (balance < MIN-BALANCE){
         balance-= PENALTY;
    system.out.println("Balance below minimum
      Penalty Imposed: "+ PENALTY);
     }
  }

 void withdraw (double amount){
   if(amount > balance){
  System.out.println("Insufficient balance");
  } else{
     balance -=amount;
     checkminimumBalance();
  System.out.println("Amount withdrawn"+ amount);
   }
  }
 }
```

```
class BankMain{

Public static void main(String[] args){

SavAcct savacct = new SavAcct("Raj", 50, 10000.0]
CurrentAccount curract= new CurrentAccount("Kiran",
              60, 20000.0);
System.out.println("savings Account:");
savacct.deposit(200);
savacount.depositAndCalculateInterest();
Savacount.withdraw(50000);
savacount.display();
System.out.println("current Account:");
current.deposit(1000);
current.withdraw(5000);
Current.display();
 }
}
```

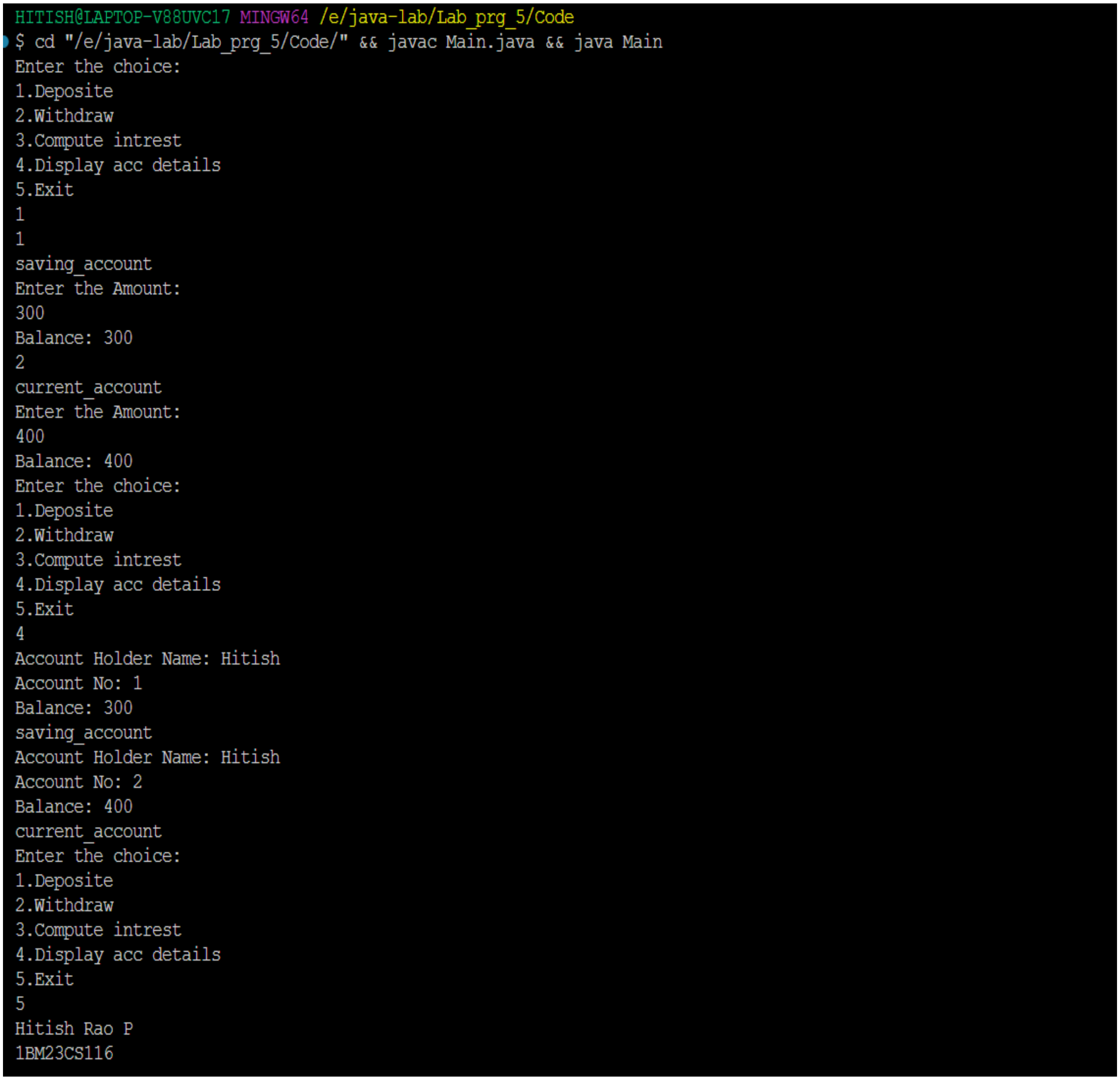
Output:

```
Savings Account:
Deposited: 500.0
Interest added: 100.0
Withdrawn: 1000.0
Account Type: Savings
Acount Number: 1001
Customer Name: Alice
Balance: 1600.0
```

CODE:

```
import java.util.Scanner;

class Account{
  Scanner sc=new Scanner(System.in);

  String name="Hitish";
  int money;
  String type;
  int accno;
  Account(String acctype,int accno){
    this.type=acctype;
    this.money=0;
    this.accno=accno;

  }
  void accdetail(){
    System.out.println("Account Holder Name: "+name);
    System.out.println("Account No: "+accno);
    System.out.println("Balance: "+money);
    System.out.println(this.type);
  }

  void deposit(){
    int mon;
    System.out.println(accno);
    System.out.println(type);
    System.out.println("Enter the Amount: ");
    mon=sc.nextInt();
    money+=mon;
    System.out.println("Balance: "+money);
  }

  void withdraw(){
    System.out.println(this.accno);
    System.out.println(type);
    int mon;
    System.out.println("Enter the Amount: ");
    mon=sc.nextInt();
    money-=mon;
    System.out.println("Balance: "+money);
    if((money<=100) && this.type=="current_account")
    {
     System.out.println("Minimum balance is 100");
     System.out.println("Deposite money now and pay the fine of 50");
    }
  }
  void cal_intrest(){
    if(this.type=="saving_account")
    {

     System.out.println(this.type);
     double temp=this.money;

     double intrest=((temp)*0.5)+temp;
     System.out.println("The intrest: "+intrest);
    }

    else
    {
     System.out.println("Not a saving account");
    }

  }
}

public class Sys {
    public static void main(String[] args) {
     Account c1=new Account("saving_account",1);
     Account c2=new Account("current_account",2);

     while(true)
     {
      Scanner sc=new Scanner(System.in);

      int choice;
      System.out.println("Enter the choice:\n1.Deposite\n2.Withdraw\n3.Compute
intrest\n4.Display acc details\n5.Exit");
      choice=sc.nextInt();
      if (choice==1)
```

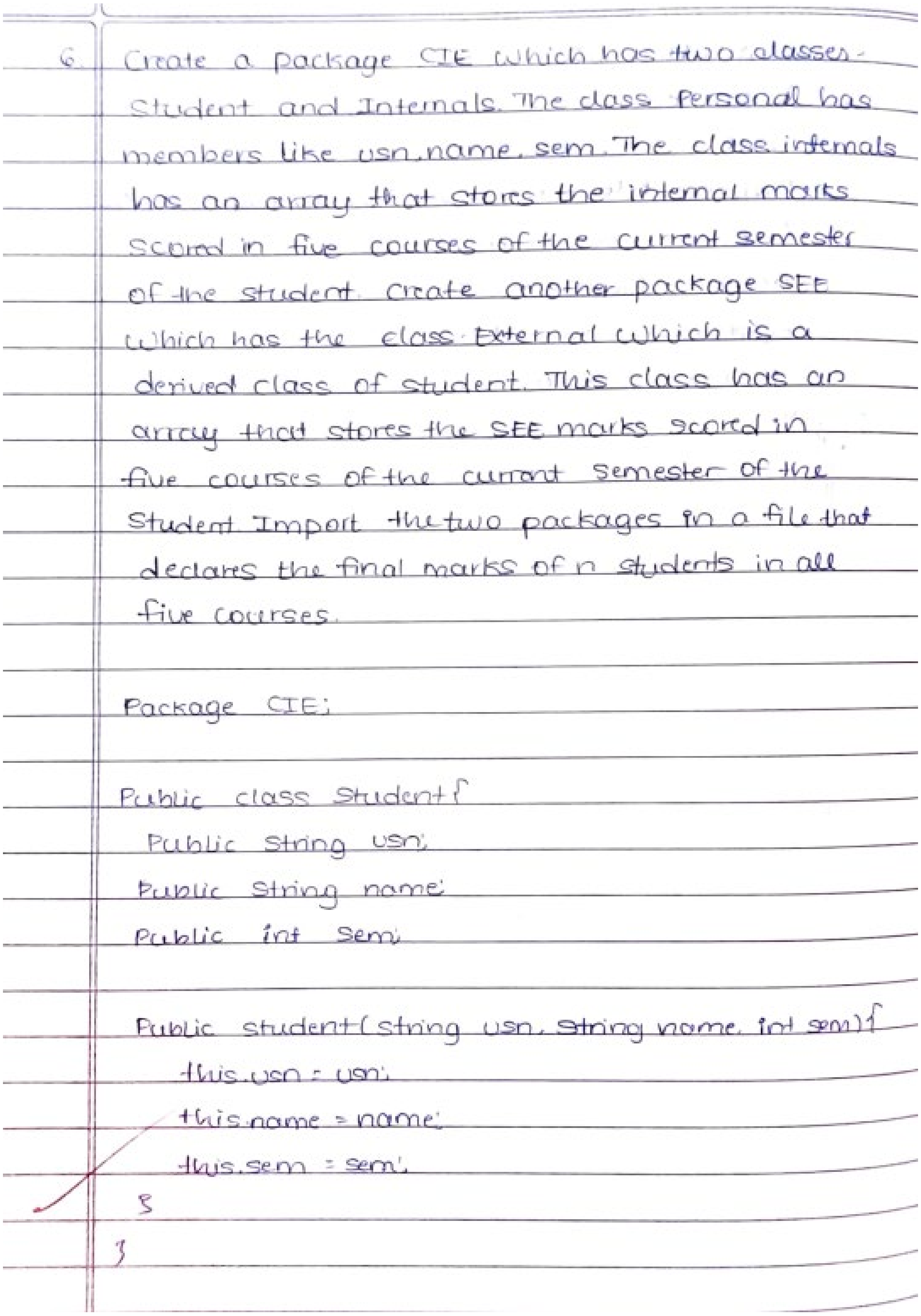
```
        {
         c1.deposit();
         c2.deposit();
        }

        if(choice==2){
          c1.withdraw();
          c2.withdraw();
        }

        if(choice==3){
         c1.cal_intrest();
         c2.cal_intrest();
       }

       if(choice==4){
        c1.accdetail();
        c2.accdetail();
     }

     if(choice==5){
      break;
      }
    }

    System.out.println("Hitish Rao P");
    System.out.println("1BM23CS116");
  }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_5/Code
$ cd "/e/java-lab/Lab_prg_5/Code/" && javac Main.java && java Main
Enter the choice:
1.Deposite
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
1
1
saving_account
Enter the Amount:
300
Balance: 300
2
current_account
Enter the Amount:
400
Balance: 400
Enter the choice:
1.Deposite
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
4
Account Holder Name: Hitish
Account No: 1
Balance: 300
saving_account
Account Holder Name: Hitish
Account No: 2
Balance: 400
current_account
Enter the choice:
1.Deposite
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
5
Hitish Rao P
1BM23CS116
```

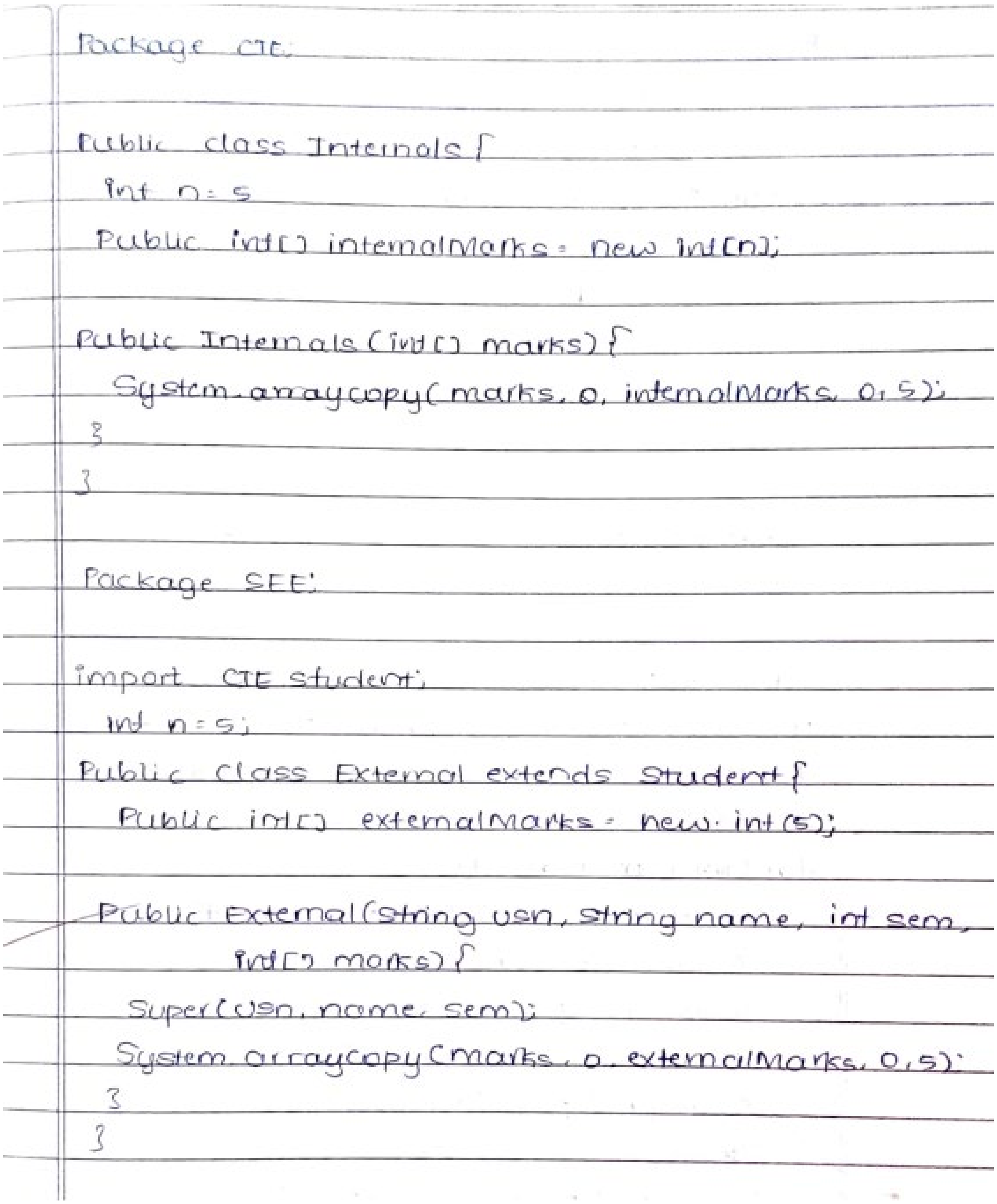
PROGRAM 6: Packages

ALGORITHM:

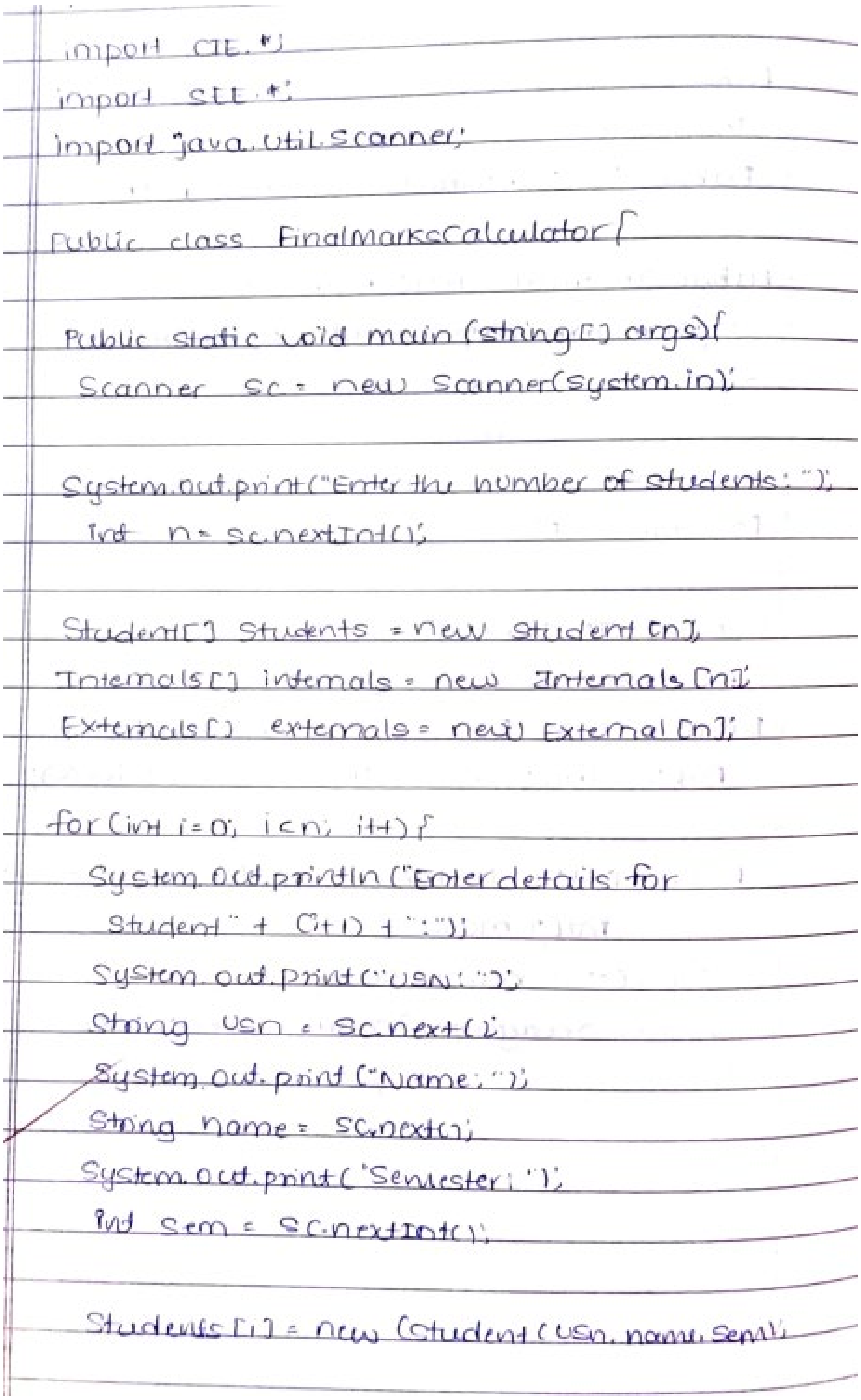


6. Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn.name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of student. This class has an array that stores the SEE marks scored in five courses of the current semester of the Student Import the two packages in a file that declares the final marks of n students in all five courses.

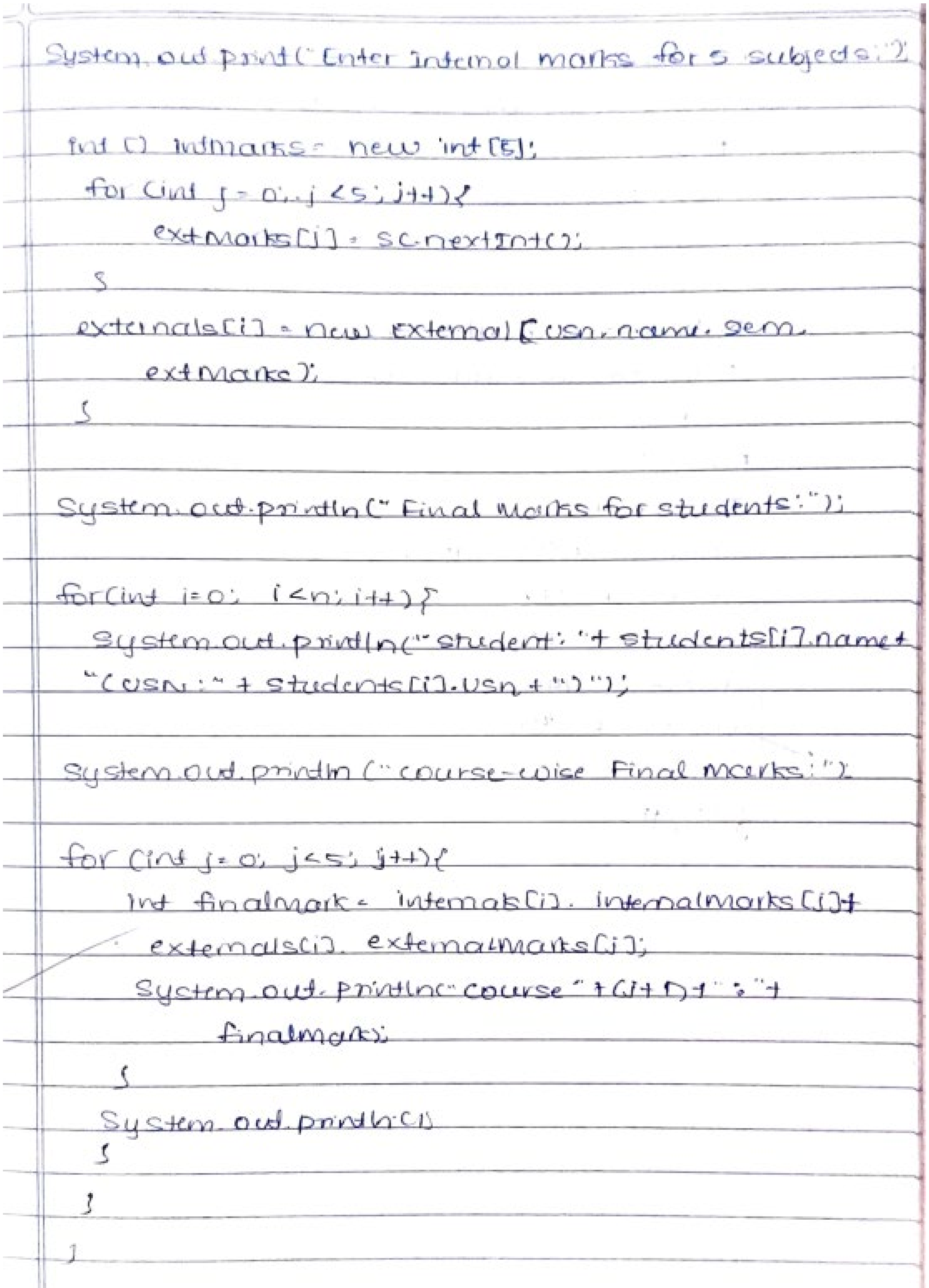
```
Package CIE;

Public class Student{
  Public String usn;
 Public String name;
 Public int Sem;

 Public student(String usn, String name, int sem){
    this.usn = usn;
    this.name = name;
    this.sem = sem;
 }
}
```



```
Package CIE:

Public class Internals{
 int n=5
 Public int[] internalMarks= new int[n];

Public Internals(int[] marks){
  System.arraycopy(marks, 0, internalMarks, 0, 5);
 }
}

Package SEE;

import CIE.student;
 int n=5;
Public class External extends Student{
  Public int[] externalMarks= new int(5);

 Public External(String usn, String name, int sem,
        int[] marks){
  Super(usn, name, sem);
  System.arraycopy(marks, 0, externalMarks, 0,5);
 }
}
```



```
import CIE.*;
import SEE.*;
import java.util.Scanner;

Public class FinalMarksCalculator{

 Public static void main(string[] args){
  Scanner sc = new Scanner(system.in);

 System.out.print("Enter the number of students: ");
  int n = sc.nextInt();

 Student[] students = new Student[n];
 Internals[] internals = new Internals[n];
 Externals[] externals = new External[n];

for(int i=0; i<n; i++){
   System.out.println("Enter details for
    Student" + (i+1) + ":");
   System.out.print("USN: ");
   String usn = sc.next();
   System.out.print("Name: ");
   String name = sc.next();
   System.out.print("Semester: ");
   int sem = sc.nextInt();

   Students[i] = new (Student(usn, name, sem);
```



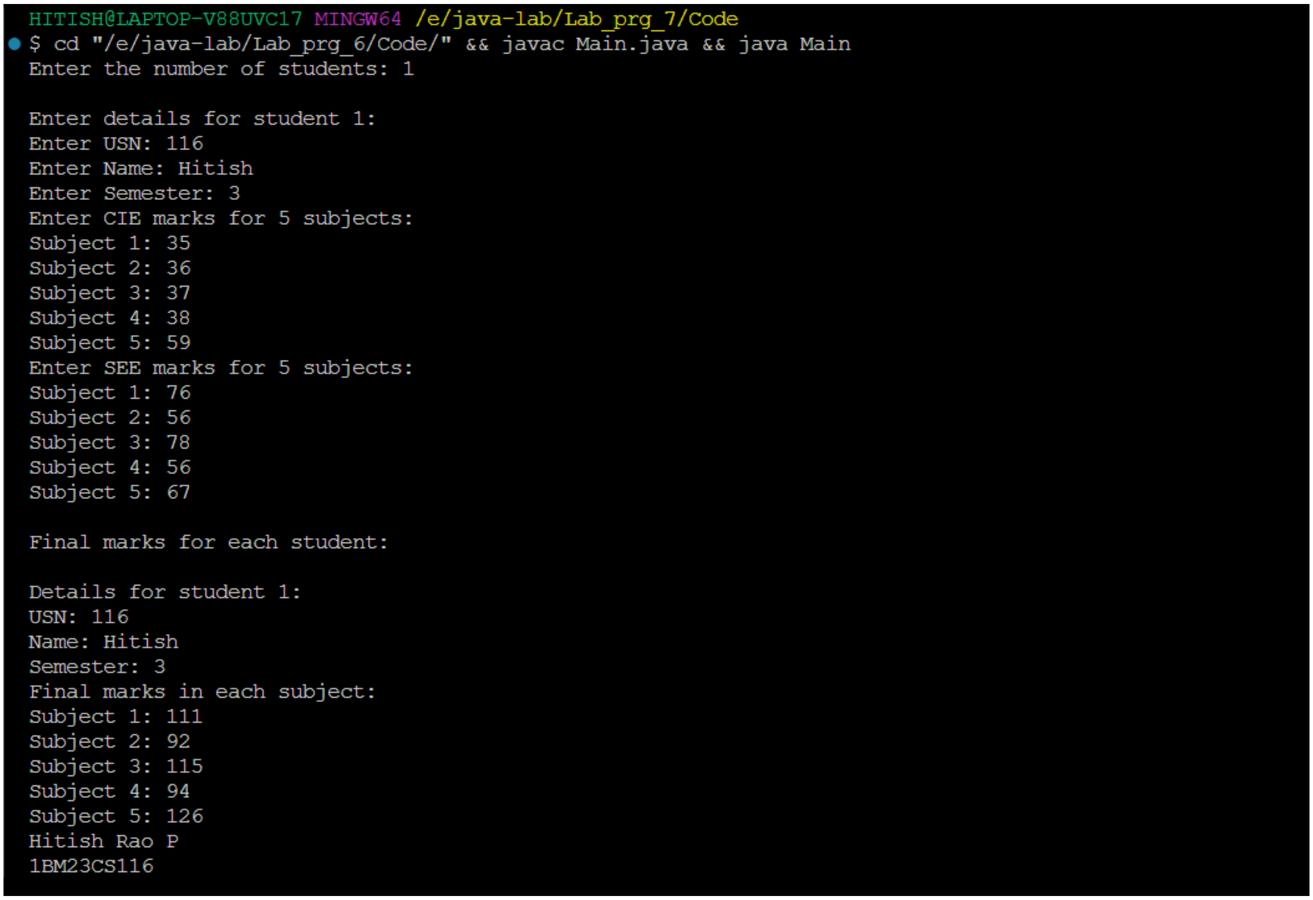
```
System.out.print("Enter internal marks for 5 subjects:");

 int [] intMarks = new int[5];
  for (int j = 0; j <5; j++){
        extMarks[j] = sc.nextInt();
  }
 externals[i] = new external[usn, name, sem,
      extMarks);
 }


System.out.println(" Final Marks for students:");

for(int i=0; i<n; i++){
  System.out.println("student: "+ students[i].name+
  "(USN:" + students[i].usn + ")");

System.out.println ("course-wise Final marks:");

for (int j=0; j<5; j++){
     Int finalmark = internals[i]. internalMarks[j]+
      externals[i]. externalMarks[j];
     System.out.println("course "+(j+1)+" : "+
          finalmark;
   }
  System.out.println()
  }
 }
}
```

CODE:

```
package CIE;

import java.util.Scanner;

public class Internals extends Student {

    int[] cieMarks = new int[5];

    public void inputCIEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter CIE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            cieMarks[i] = s.nextInt();
        }
    }

    public int[] getCieMarks() {
        return cieMarks;
    }
}


package CIE;

import java.util.Scanner;

public class Student {
    protected String usn;
    protected String name;
    protected int sem;

    public void inputStudentDetails() {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter USN: ");
        usn = s.nextLine();
        System.out.print("Enter Name: ");
        name = s.nextLine();
        System.out.print("Enter Semester: ");
        sem = s.nextInt();
    }

    public void displayStudentDetails() {
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
        System.out.println("Semester: " + sem);
    }
}

package SEE;

import CIE.Student;
import java.util.Scanner;

public class External extends Student {
    int[] seeMarks = new int[5];

    public void inputSEEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter SEE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            seeMarks[i] = s.nextInt();
        }
    }

    public int[] getSeeMarks() {
        return seeMarks;
    }
}


import CIE.Internals;
import SEE.External;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
```

```
Scanner sc = new Scanner(System.in);

System.out.print("Enter the number of students: ");
int numStudents = sc.nextInt();
sc.nextLine();

Internals[] cieStudents = new Internals[numStudents];
External[] seeStudents = new External[numStudents];

for (int i = 0; i < numStudents; i++) {
    System.out.println("\nEnter details for student " + (i + 1) + ":");

    cieStudents[i] = new Internals();
    cieStudents[i].inputStudentDetails();
    cieStudents[i].inputCIEMarks();

    seeStudents[i] = new External();
    seeStudents[i].inputSEEMarks();
}

System.out.println("\nFinal marks for each student:");
for (int i = 0; i < numStudents; i++) {
    System.out.println("\nDetails for student " + (i + 1) + ":");
    cieStudents[i].displayStudentDetails();

    int[] cieMarks = cieStudents[i].getCieMarks();
    int[] seeMarks = seeStudents[i].getSeeMarks();
    int[] finalMarks = new int[5];

    System.out.println("Final marks in each subject:");
    for (int j = 0; j < 5; j++) {
        finalMarks[j] = cieMarks[j] + seeMarks[j];
        System.out.println("Subject " + (j + 1) + ": " + finalMarks[j]);
    }
}

sc.close();

System.out.println("Hitish Rao P");
System.out.println("1BM23CS116");
```

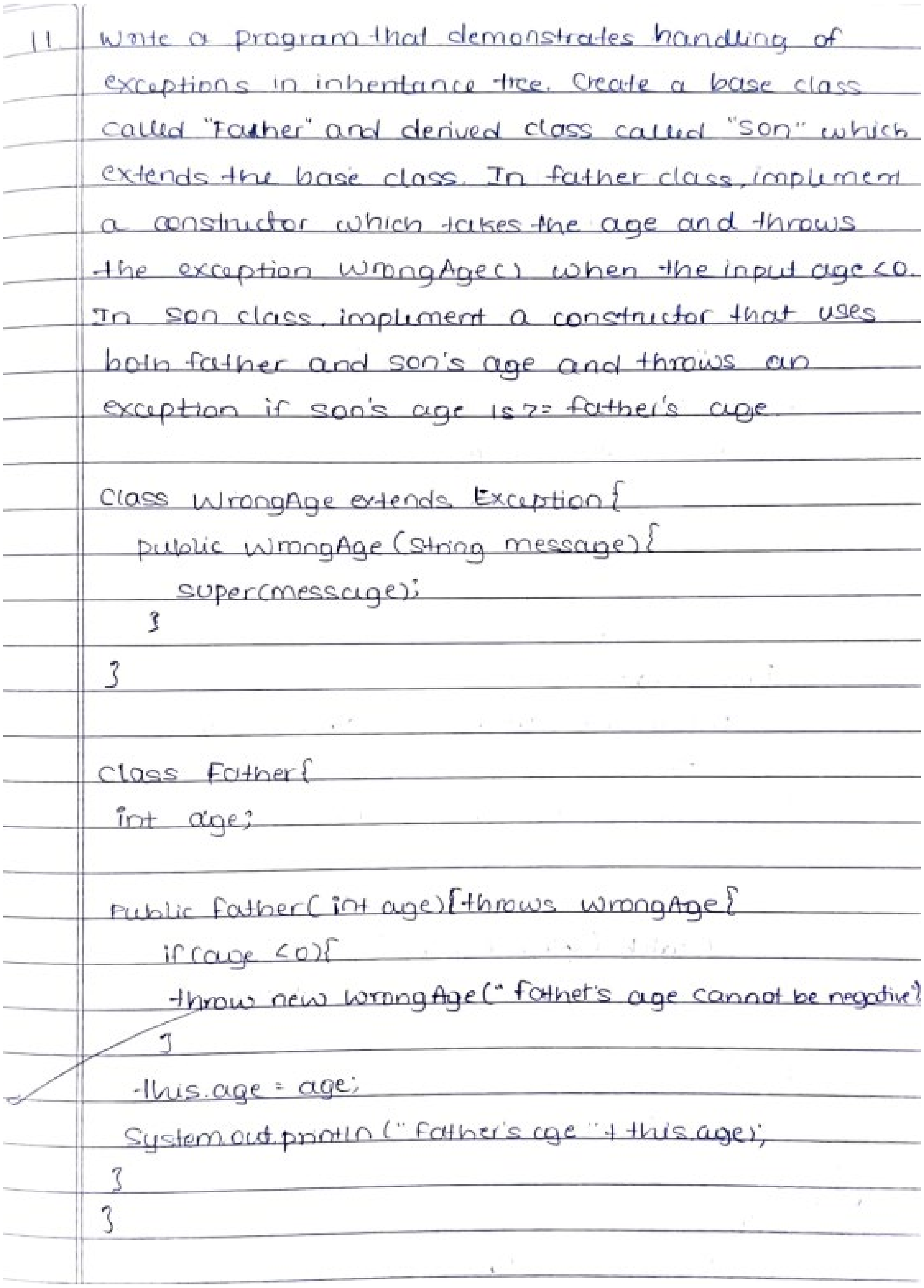
```
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_7/Code
$ cd "/e/java-lab/Lab_prg_6/Code/" && javac Main.java && java Main
Enter the number of students: 1

Enter details for student 1:
Enter USN: 116
Enter Name: Hitish
Enter Semester: 3
Enter CIE marks for 5 subjects:
Subject 1: 35
Subject 2: 36
Subject 3: 37
Subject 4: 38
Subject 5: 59
Enter SEE marks for 5 subjects:
Subject 1: 76
Subject 2: 56
Subject 3: 78
Subject 4: 56
Subject 5: 67

Final marks for each student:

Details for student 1:
USN: 116
Name: Hitish
Semester: 3
Final marks in each subject:
Subject 1: 111
Subject 2: 92
Subject 3: 115
Subject 4: 94
Subject 5: 126
Hitish Rao P
1BM23CS116
```

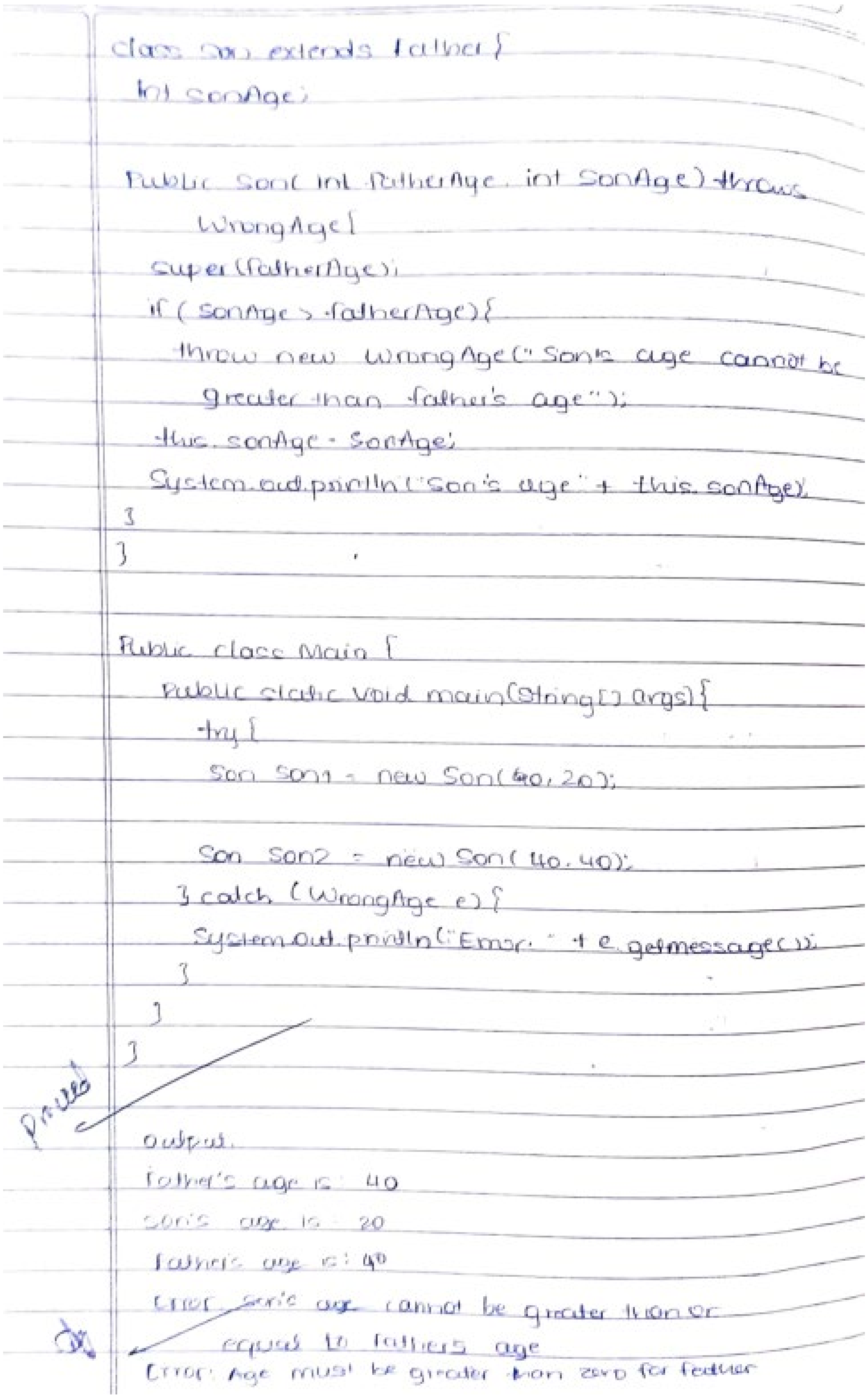
PROGRAM 7: Exception handling

ALGORITHM:



11 Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "son" which extends the base class. In father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age<0. In son class, implement a constructor that uses both father and son's age and throws an exception if son's age is >= father's age.

```
Class WrongAge extends Exception{
   public WrongAge(String message){
      super(message);
   }
}

Class Father{
 int age;

 Public Father(int age){throws WrongAge{
     if(age <0){
      throw new WrongAge(" Father's age cannot be negative")
     }
   this.age = age;
   System.out.println(" Father's age " + this.age);
 }
}
```



```
class Son extends Father{
 int sonAge;

 Public Son( int fatherAge, int SonAge) throws
    WrongAge{
  super(fatherAge);
  if ( sonAge > fatherAge){
   throw new WrongAge("Son's age cannot be
     greater than father's age");
  this.sonAge = SonAge;
  System.out.println("Son's age" + this.sonAge);
 }
}

Public class Main {
  Public static Void main(String[] args){
    try{
     Son Son1 = new Son(40, 20);

     Son Son2 = new Son( 40, 40);
    } catch (WrongAge e){
     System.out.println("Error: " + e.getmessage());
    }
  }
}
```

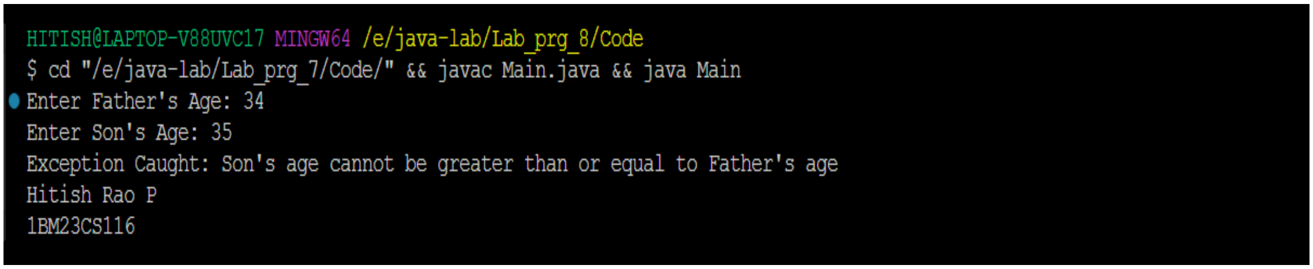
Passed

```
output.
father's age is: 40
son's age is: 20
father's age is: 40
Error: Son's age cannot be greater than or
      equal to fathers age
Error: Age must be greater than zero for father
```

CODE:

```
import java.util.Scanner;

class WrongAge extends Exception {

   public WrongAge() {
      super("Age Error");
   }

   public WrongAge(String message) {
      super(message);
   }
}

class Father {
   protected int fatherAge;

   public Father() throws WrongAge {
      Scanner s = new Scanner(System.in);
      System.out.print("Enter Father's Age: ");
      fatherAge = s.nextInt();
      if (fatherAge < 0) {
         throw new WrongAge("Age cannot be negative");
      }
   }

   public void display() {
      System.out.println("Father's Age: " + fatherAge);
   }
}

class Son extends Father {
   private int sonAge;

   public Son() throws WrongAge {
      super();
      Scanner s = new Scanner(System.in);
      System.out.print("Enter Son's Age: ");
      sonAge = s.nextInt();
```

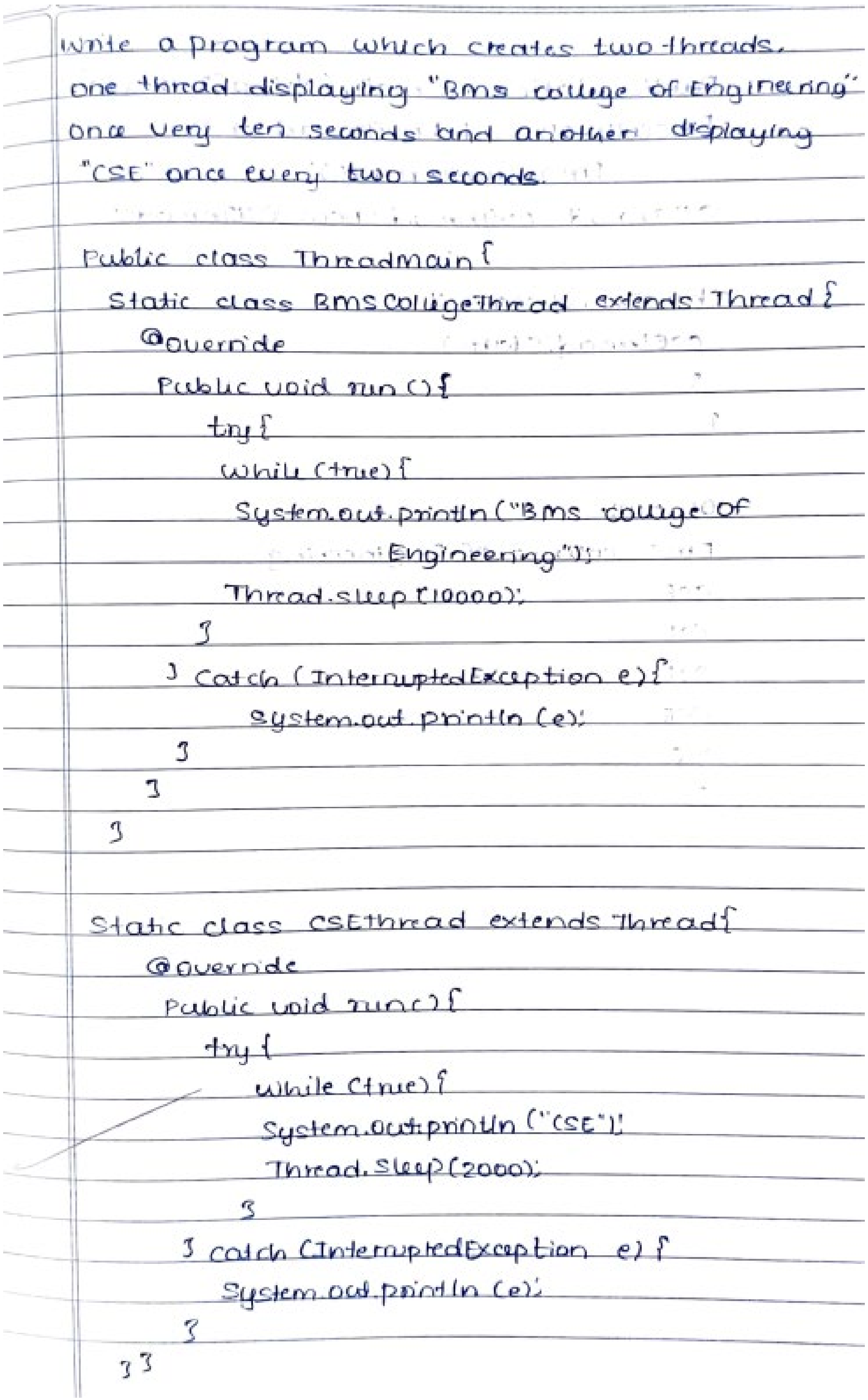
```
        if (sonAge < 0) {
            throw new WrongAge("Age cannot be negative");
        } else if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to Father's
age");
        }
    }

    @Override
    public void display() {
        super.display();
        System.out.println("Son's Age: " + sonAge);
    }
}

public class Main {
    public static void main(String[] args) {
        try {
            Son son = new Son();
            son.display();
        } catch (WrongAge e) {
            System.out.println("Exception Caught: " + e.getMessage());
        }

        System.out.println("Hitish Rao P");
        System.out.println("1BM23CS116");
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_8/Code
$ cd "/e/java-lab/Lab_prg_7/Code/" && javac Main.java && java Main
Enter Father's Age: 34
Enter Son's Age: 35
Exception Caught: Son's age cannot be greater than or equal to Father's age
Hitish Rao P
1BM23CS116
```

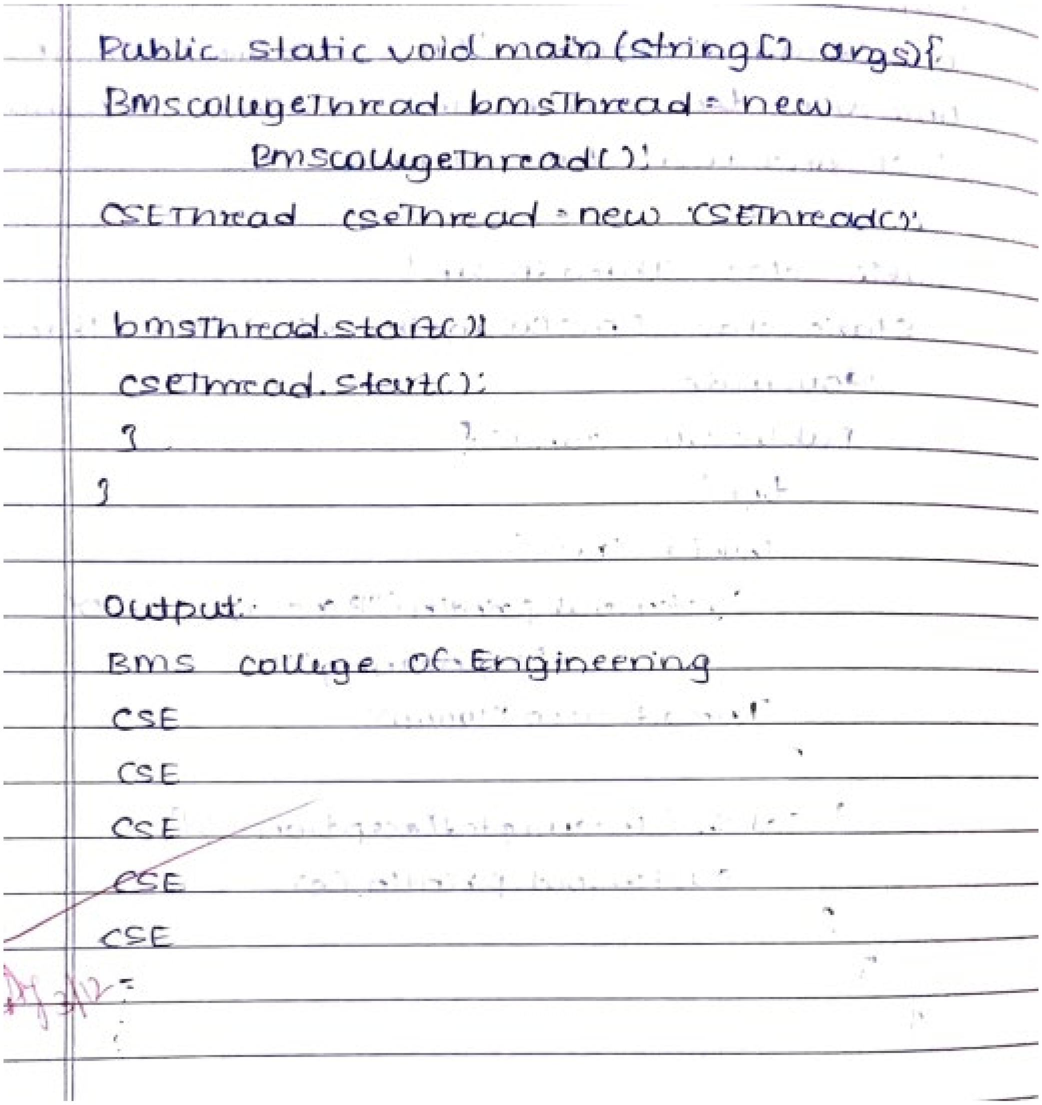
PROGRAM 8: Threads

ALGORITHM:



write a program which creates two threads.
one thread displaying "Bms college of Engineering"
once very ten seconds and another displaying
"CSE" once every two seconds.

```
Public class Threadmain{
  Static class BmsCollegeThread extends Thread{
    @override
    Public void run(){
       try{
        while(true){
         System.out.println("Bms college of
                Engineering");
        Thread.sleep(10000);
       }
      } catch (InterruptedException e){
          system.out.println(e);
      }
    }
  }

 Static class CSEthread extends Thread{
    @override
     Public void run(){
       try{
          while(true){
          System.out.println("CSE");
          Thread.Sleep(2000);
         }
       } catch(InterruptedException e){
        System.out.println(e);
       }
  }}
```

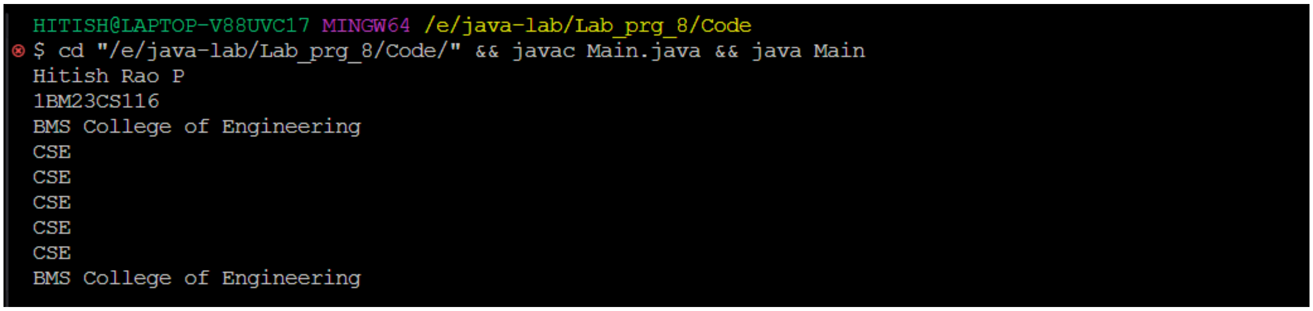


```
Public static void main(string[] args){
BmscollegeThread bmsThread = new
        BmscollegeThread();
CSEThread cseThread = new CSEThread();

 bmsThread.start();
 cseThread.start();
 }
}

Output:
BMS college of Engineering
CSE
CSE
CSE
CSE
CSE
```

CODE:

```
class CollegeThread extends Thread {
    @Override
    public void run() {
        try {
            for (int i = 0; i < 5; i++) {
                System.out.println("BMS College of Engineering");
                Thread.sleep(10000);
            }
        } catch (InterruptedException e) {
            System.out.println("CollegeThread interrupted");
        }
    }
}
```

```
class CSEThread extends Thread {
    @Override
    public void run() {
        try {
            for (int i = 0; i < 5; i++) {
                System.out.println("CSE");
                Thread.sleep(2000);
            }
        } catch (InterruptedException e) {
            System.out.println("CSEThread interrupted");
        }
    }
}

public class Main {
    public static void main(String[] args) {
        CollegeThread collegeThread = new CollegeThread();
        CSEThread cseThread = new CSEThread();

        collegeThread.start();
        cseThread.start();

        System.out.println("Hitish Rao P");
        System.out.println("1BM23CS116");
    }
}
```



```
HITISH@LAPTOP-V88UVC17 MINGW64 /e/java-lab/Lab_prg_8/Code
⊗ $ cd "/e/java-lab/Lab_prg_8/Code/" && javac Main.java && java Main
Hitish Rao P
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```
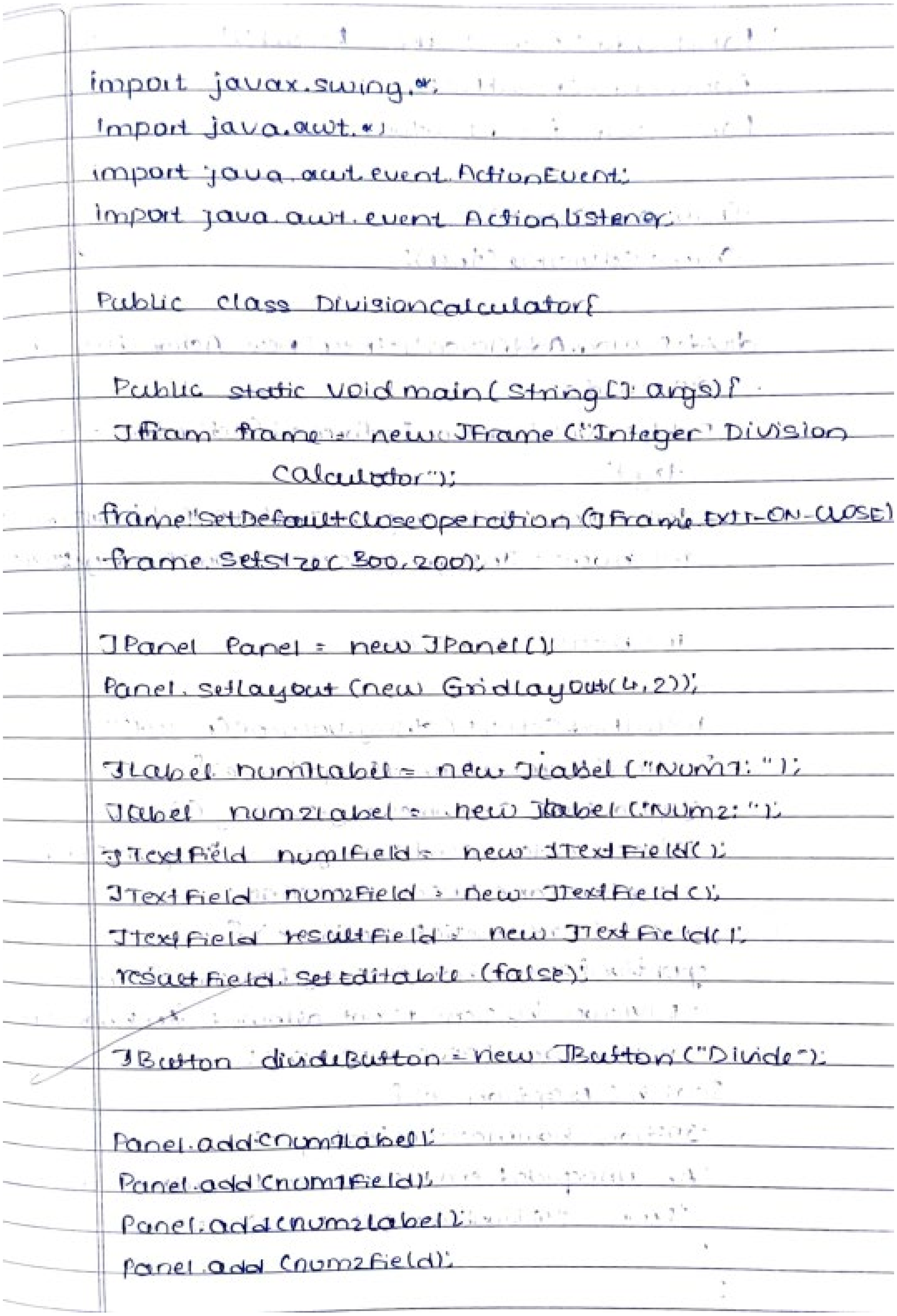
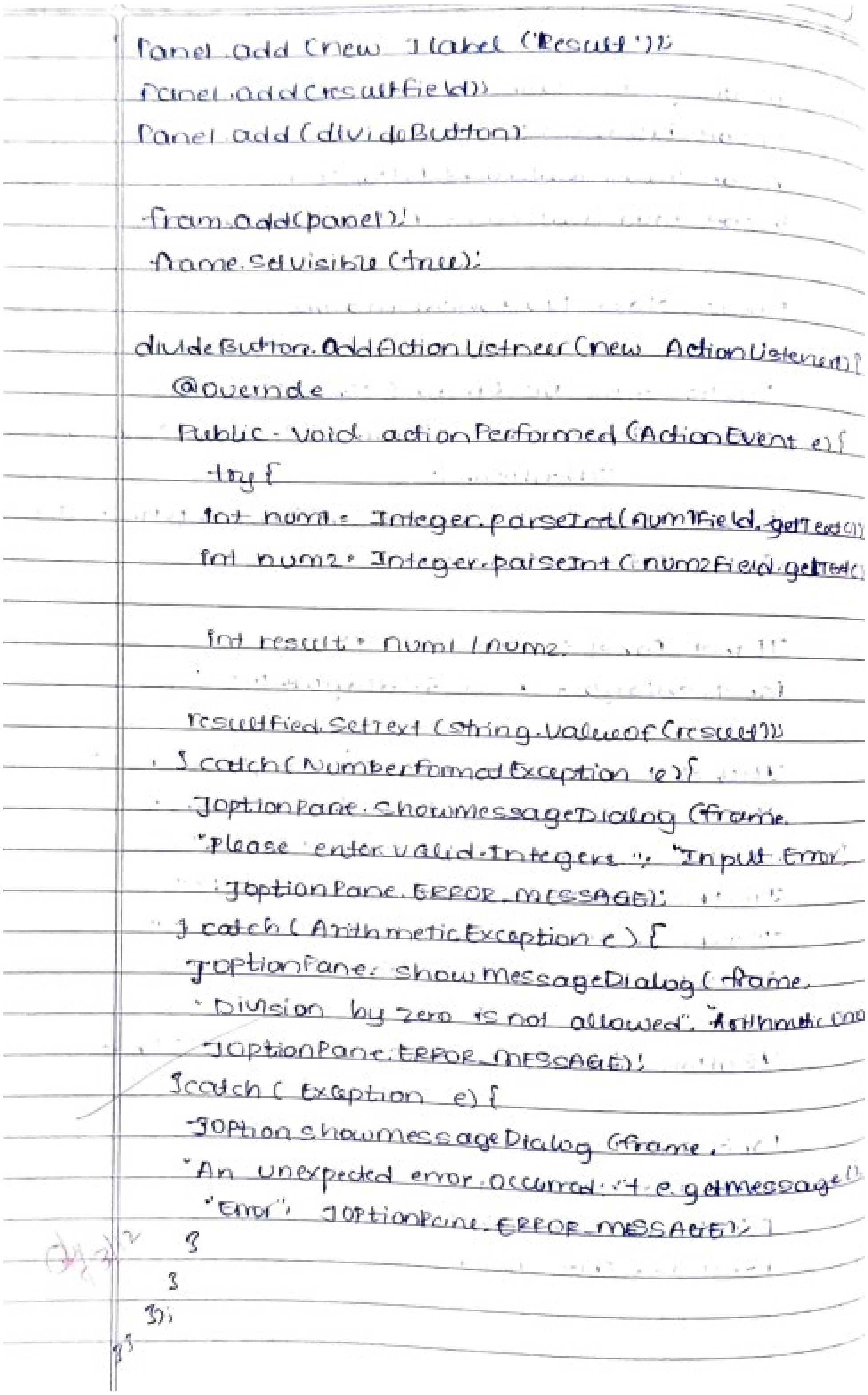

PROGRAM 9: Calculator using java.awt

ALGORITHM:



```
import javax.swing.*;
Import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

Public class DivisionCalculator{

 Public static void main(String[] args){
 JFram frame = new JFrame("Integer Division
            Calculator");
frame.SetDefaultCloseOperation(JFrame.EXIT-ON-CLOSE)
frame.SetSize(300,200);

JPanel Panel = new JPanel();
Panel.setLayout(new GridLayout(4,2));

JLabel num1Label = new JLabel("Num1:");
JLabel num2Label = new JLabel("Num2:");
JTextField num1Field = new JTextField();
JTextField num2Field = new JTextField();
JTextField resultField = new JTextField();
resultField.SetEditable(false);

JButton divideButton = new JButton("Divide");

Panel.add(num1Label);
Panel.add(num1Field);
Panel.add(num2Label);
Panel.add(num2Field);
```



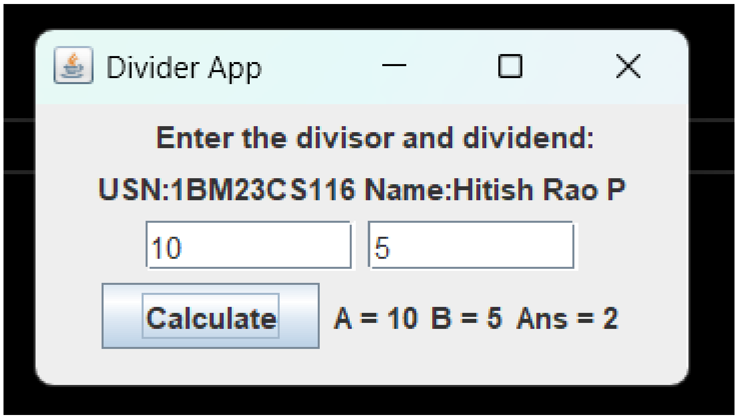
```
Panel.add (new Jlabel ('Result'));
Panel.add(resultField));
Panel add (divideButton):

from.add(panel)!
frame.setvisible (true):

divideButton.AddActionListneer(new ActionListener() {
  @override
  Public void actionPerformed (ActionEvent e) {
    try {
    int num1 = Integer.parseInt(num1Field.getText())
    int num2 = Integer.parseInt (num2Field.getText(

    int result = num1 / num2.

   resultField.SetText (string.valueOf (result)));
  } catch(NumberFormatException 'e') {
   JOptionPane.showMessageDialog (frame.
   "please enter valid Integers ", "Input Error",
     JoptionPane.ERROR_MESSAGE);
  } catch (ArithmeticException e ) {
   JOptionPane. showMessageDialog ( frame.
   "Division by zero is not allowed", "Arithmetic Erro
    JOptionPane.ERROR_MESSAGE)!
  }catch ( Exeption e) {
   JOPtion showMessageDialog (frame,
   "An unexpected error occurred: "+ e.getmessage()
    "Error", JOPtionPane.ERROR_MESSAGE); }
    }
   }
 });
}}
```

C

CODE:

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

class SwingDemo {
   SwingDemo() {
      JFrame jfrm = new JFrame("Divider App");
      jfrm.setSize(275, 150);
      jfrm.setLayout(new FlowLayout());
      jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

      JLabel jlab = new JLabel("Enter the divisor and dividend:");
      JLabel jlab1 = new JLabel("USN:1BM23CS116 Name:Hitish Rao P");
      JTextField ajtf = new JTextField(8);
      JTextField bjtf = new JTextField(8);
      JButton button = new JButton("Calculate");
      JLabel err = new JLabel();
      JLabel alab = new JLabel();
      JLabel blab = new JLabel();
      JLabel anslab = new JLabel();

      jfrm.add(err);
      jfrm.add(jlab);
      jfrm.add(jlab1);
      jfrm.add(ajtf);
      jfrm.add(bjtf);
      jfrm.add(button);
      jfrm.add(alab);
      jfrm.add(blab);
      jfrm.add(anslab);

      ActionListener l = new ActionListener() {
         public void actionPerformed(ActionEvent evt) {
            System.out.println("Action event from a text field");
         }
      };

      ajtf.addActionListener(l);
```

```
        bjtf.addActionListener(l);

        button.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent evt) {
                try {
                    int a = Integer.parseInt(ajtf.getText());
                    int b = Integer.parseInt(bjtf.getText());
                    int ans = a / b;

                    alab.setText("A = " + a);
                    blab.setText("B = " + b);
                    anslab.setText("Ans = " + ans);
                    err.setText("");
                } catch (NumberFormatException e) {
                    alab.setText("");
                    blab.setText("");
                    anslab.setText("");
                    err.setText("Enter Only Integers!");
                } catch (ArithmeticException e) {
                    alab.setText("");
                    blab.setText("");
                    anslab.setText("");
                    err.setText("B should be NON zero!");
                }
            }
        });

        jfrm.setVisible(true);
    }

    public static void main(String args[]) {
        SwingUtilities.invokeLater(new Runnable() {
            public void run() {
                new SwingDemo();
            }
        });
    }
}
```



Enter the divisor and dividend:

USN:1BM23CS116 Name:Hitish Rao P

10

5

A = 10 B = 5 Ans = 2